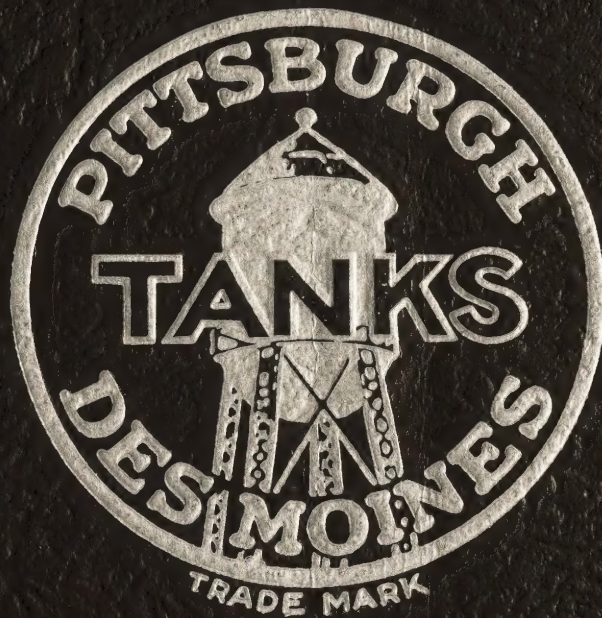


MODERN WATER STORAGE



PITTSBURGH-DES MOINES STEEL COMPANY

100°

MODERN WATER STORAGE

for

MUNICIPAL WATER WORKS
PRIVATE WATER SYSTEMS
INDUSTRIAL PLANTS
INSTITUTIONS
RAILWAYS

TR-3



PITTSBURGH • DES MOINES STEEL COMPANY



27656



MODERN WATER STORAGE



JACKSON PARK, MILWAUKEE, WIS.
(1,500,000 gallons)

Height to bottom.....117 feet
Diameter.....79 feet
Depth of Water.....50 feet

Adequate Elevated Water Storage Will Give Your Water System the Following Advantages:

1. Improved Pressures
2. Ample Supply at Periods of Peak Demand
3. A Simplified Pumping Schedule
4. Service During Interruptions in Pumping
5. Lower Operating Costs
6. Lower Total Plant Investment
7. Improved Fire Protection at Lower Rates
8. Improved Service to Outlying Districts from Existing Water Mains.

EVERY LIBRARY
COLUMBIA UNIVERSITY



PITTSBURGH · DES MOINES STEEL COMPANY





FOR MUNICIPALITIES

The gravity system is "Nature's Way"...
an elevated reserve supply is always ready

A modern municipal water system must not only have an unfailing source of supply, but it must also have a dependable means of delivering the water to its consumers. Pumps should deliver water into an elevated storage tank, which will insure an even pressure and provide the necessary reserve in the event of pump failure.

More even and reliable pressures are maintained by using elevated storage on any water system, no matter how small, but this is particularly true for cities where large areas are served from one source of supply. In that case the distribution system is divided into several districts, each with its own feeder line from the main pumping station, and each with its own elevated tank. For outlying districts, far from the pumping station, an elevated tank makes service possible, when the cost of mains of the size necessary without a tank, would be prohibitive.

Demands made on a water system have very marked seasonal, daily and hourly variations. To attempt to follow such demands directly with pumps means excessive investment in treating plant, pumping equipment and feeder mains. Elevated storage will smooth out the demand curve so that the other equipment need only be capable of supplying water at the average daily rate.



WINONA, MINN.

(500,000 gallons)
Height to bottom..... 106 feet, 6 inches
Diameter..... 44 feet
Depth of water..... 48 feet, 3 inches

Pumps operate most efficiently through only a narrow range of output. If the output is above or below this range, the power cost is unnecessarily high. With elevated storage available in the proper amount, pumps may always operate at maximum efficiency—resulting in minimum power costs and very efficient pumping schedules.

The Fire Underwriters recognize the greater dependability of a system with adequate elevated storage when they establish insurance rates.

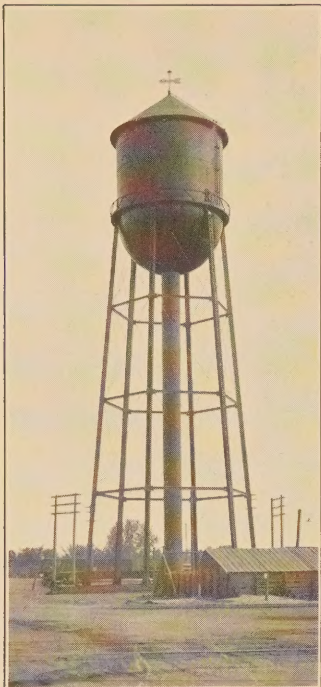




MODERN WATER STORAGE



For the Small Community Health · Security · Prosperity



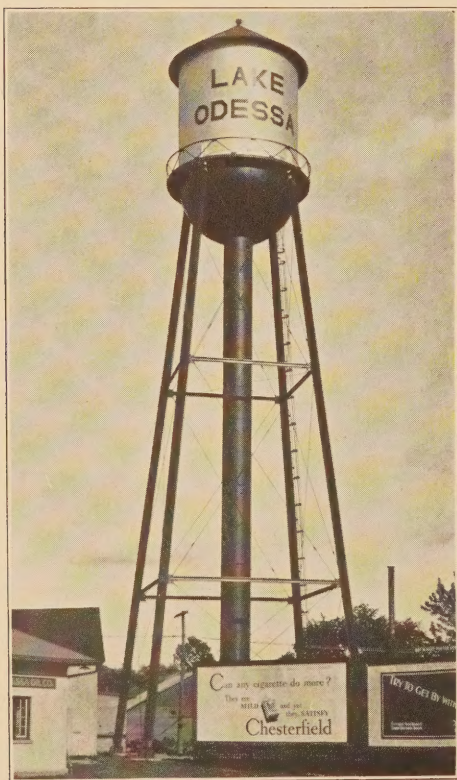
WEBSTER CITY, IA.—(250,000 gals.)
Height to bottom.....100 feet
Diameter.....32 feet
Depth of water.....45 feet, 4 inches

THE small community or town having a modern water works with a suitable reserve supply in an elevated tank will enjoy improved community health through the elimination of possible contamination; safety to property through fire protection; more attractive surroundings through the ability to maintain lawns and gardens; and added prosperity through lower insurance rates. Increasing population, and the location of factories. Improvement facilities are responsible for a decided movement from the congested centers to the nearby communities. Industries and farmers, being a location insist on these advantages of a modern water system.

Some may think their community too small to finance the construction of a complete water works or even of an elevated tank. A representative may help in such cases. He is in a position to furnish the information as to the most economical types of equipment for any installation and will, if desired, assist in the complete layout, the financial arrangements and the proper method of procedure.

"Pittsburgh-Des Moines" service originated over forty years ago, serving municipalities in the construction of complete water works systems. Under the original leadership, this organization is available to construct the complete plant or to improve an existing water system.

On July 16, 1930 the town of Lake Odessa, Michigan suffered "the most disastrous explosion and fire we ever had ... the whole town looked doomed, but we had 75,000 gallons of water on hand in your tank—ample water to put out the fire—which saved our town" wrote the former village president in a letter to this company on July 17, 1930. On the left is a view of this tank which saved many times its cost for Lake Odessa citizens in valuable property during this unexpected emergency.



LAKE ODESSA, MICH.—(75,000 gallons)
Height to bottom.....91 feet
Diameter.....21 feet
Depth of water.....30 feet, 6 inches



PITTSBURGH · DES MOINES STEEL COMPANY





MODERN WATER STORAGE



Fire May Destroy Your Plant!

STATISTICS show that there is a fire somewhere in America which destroys valuable property every eighty seconds. At every thirty minutes a fire which, in addition to destroying property, takes one or more human lives. The average fire carries a burden of some five million dollars of property loss and a human toll of some fifteen thousand lives as a result. The enemy of fire is water. The most effective time to fight a fire is when it starts. The Pittsburgh-Des Moines sprinkler system, backed up with a source of water, at sufficient pressure, such as a "Pittsburgh-Des Moines" elevated tank, is the most reliable and effective means of combating fires.



BROWN CAMP HARDWARE COMPANY, DES MOINES, IOWA
(53,000 gallons)

Height to bottom.....	25 feet
Diameter.....	19 feet
Depth of water.....	26 feet

"Pittsburgh-Des Moines" elevated steel water tanks will be approved by any insurance underwriters as a primary source for sprinkler systems, and makes the installation of a sprinkler system possible in localities where city water in sufficient volume and pressure is not available.

Even in cases where the city water supply is approved by the underwriters, an elevated tank is frequently used as a secondary source, and the underwriters recognize this additional protection by quoting still lower insurance rates in such cases.

In cases where private water supplies are available at a lower cost than the city water charge, it is sometimes possible to effect large savings by providing a "Pittsburgh-Des Moines" dual supply tank. This tank is arranged to reserve the proper amount of storage for sprinkler protection and leaves available the remainder for mill use.



FISHER BODY CORPORATION, SEATTLE, WASH.
(200,000 gallons in elevated tank) (300,000 gallons in ground tank)

Height to bottom.....	100 feet	Diameter.....	42 feet
Diameter.....	32 feet	Depth of water.....	29 feet
Depth of water.....	36 feet		



PITTSBURGH-DES MOINES STEEL COMPANY

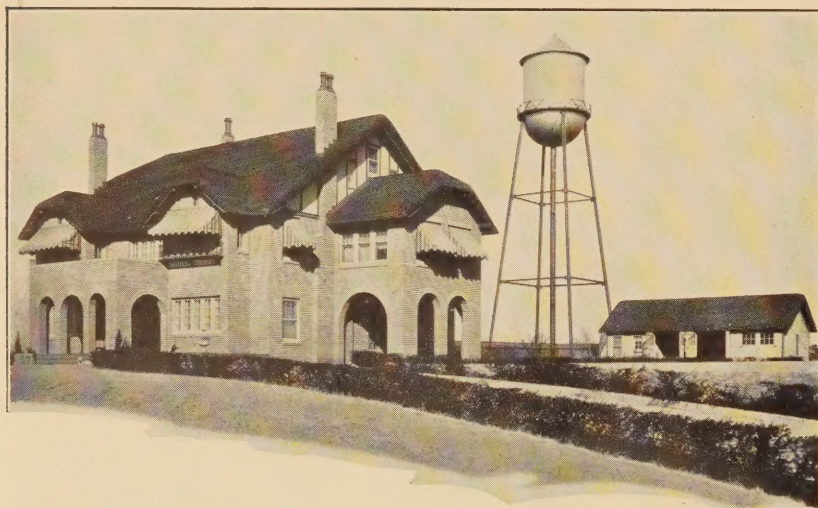




MODERN WATER STORAGE



Elevated Tanks for Private Water Systems...



BRECKENRIDGE, TEXAS
(100,000 gallons)

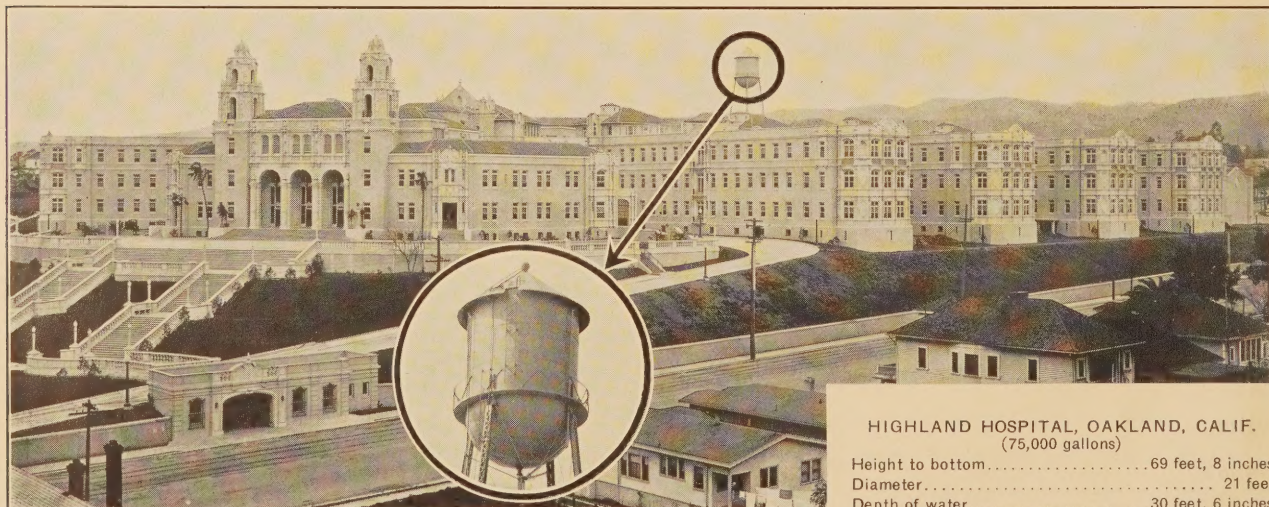
Height to Bottom.....	100 feet
Diameter.....	24 feet
Depth of water.....	31 feet

Country Estates
Institutions
Country Clubs
City Subdivisions
Industrial Plants

INSTITUTIONS, real estate developments, factories, private estates and country clubs are usually located in an outlying territory remote from a municipal water system and find it difficult to secure satisfactory

water service. They frequently find it more economical and satisfactory to install a private water system. A "Pittsburgh-Des Moines" elevated tank assures these systems economical operation, reliable fire protection and constant adequate pressure to all lines. Such a system affords all the advantages of a city supply as outlined on page two. An automatic control on the booster pump will keep the tank full and reduce supervision of the pumping to a minimum.

Golf and country clubs place an unusually heavy burden on their water systems. Abundant quantities of water are required at the same hours for golf course and lawn sprinklers, shower baths and kitchen.



HIGHLAND HOSPITAL, OAKLAND, CALIF.
(75,000 gallons)

Height to bottom.....	69 feet, 8 inches
Diameter.....	21 feet
Depth of water.....	30 feet, 6 inches



PITTSBURGH • DES MOINES STEEL COMPANY





MODERN WATER STORAGE



High pressures are required to overcome the friction losses in hose and water pipe to the outlying golf greens. Other types of systems are seldom able to take care of this demand. When city water pressures are insufficient, a booster pump with an elevated tank will quickly remedy the trouble.

The additional fire protection afforded by an automatic sprinkler system is always desirable. Marked reductions in fire insurance premiums are immediately available when elevated storage is used. In many instances these savings over a few years will pay for the tank.

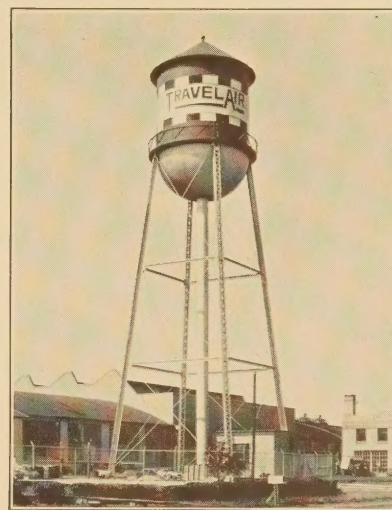
A "Pittsburgh-Des Moines" tank may be built for a dual service, that is...one tank supply the automatic sprinklers as well as the general water service of the club, factory or private water system.

Disinc advantages assured to country clubs and golf courses by an elevated tank are:

1. Strong, delightful shower baths.
2. Clean lavatories.
3. Sanitary kitchens and pantries.
4. Well kept lawns, shrubbery, porches and woodwork.
5. Improved cafe and dining room service.
6. Green fairways, velvety greens and a better golf course.
7. Reliable fire protection at reduced insurance rates.



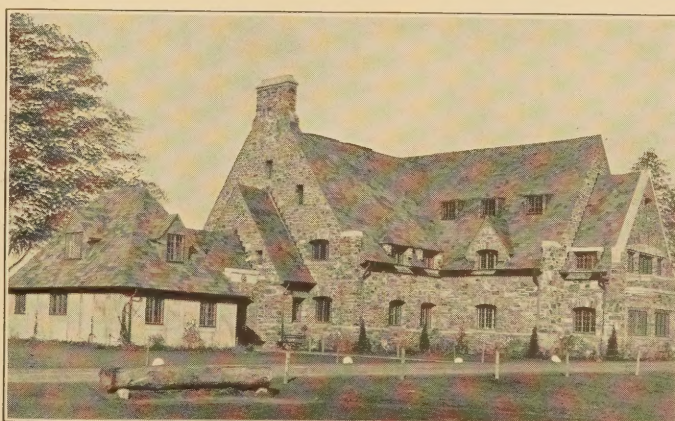
Highland Country Club
Bellevue, Pa.
(30,000 gallons)
Height to bottom.....94 ft., 8 in.
Diameter.....15 feet
Depth of water.....23 ft., 8 in.



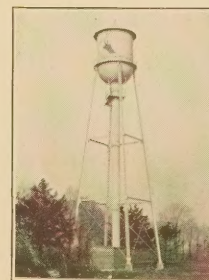
Travel Air Company, Wichita, Kansas
(100,000 gallons)
Height to bottom.....75 feet
Diameter.....24 feet
Depth of Water.....31 feet



Winged Foot Golf Club
Mamaroneck, N. Y.
(50,000 gallons)
Height to bottom...100 feet
Diameter.....19 feet
Depth water....25 ft., 6 in.



West Wing of the Winged Foot Club House. This well known club has two 18-hole golf courses and has installed two "Pittsburgh-Des Moines" elevated tanks. The 50,000 gallon tank at the left supplies water for their extensive golf courses; the 25,000 gallon tank at the right carries the club's famous monogram and is used exclusively for the fire protection and domestic service of their buildings.



Winged Foot Golf Club
Mamaroneck, N. Y.
(25,000 gallons)
Height to bottom...75 feet
Diameter.....15 feet
Depth water....19 ft., 6 in.



PITTSBURGH • DES MOINES STEEL COMPANY





MODERN WATER STORAGE

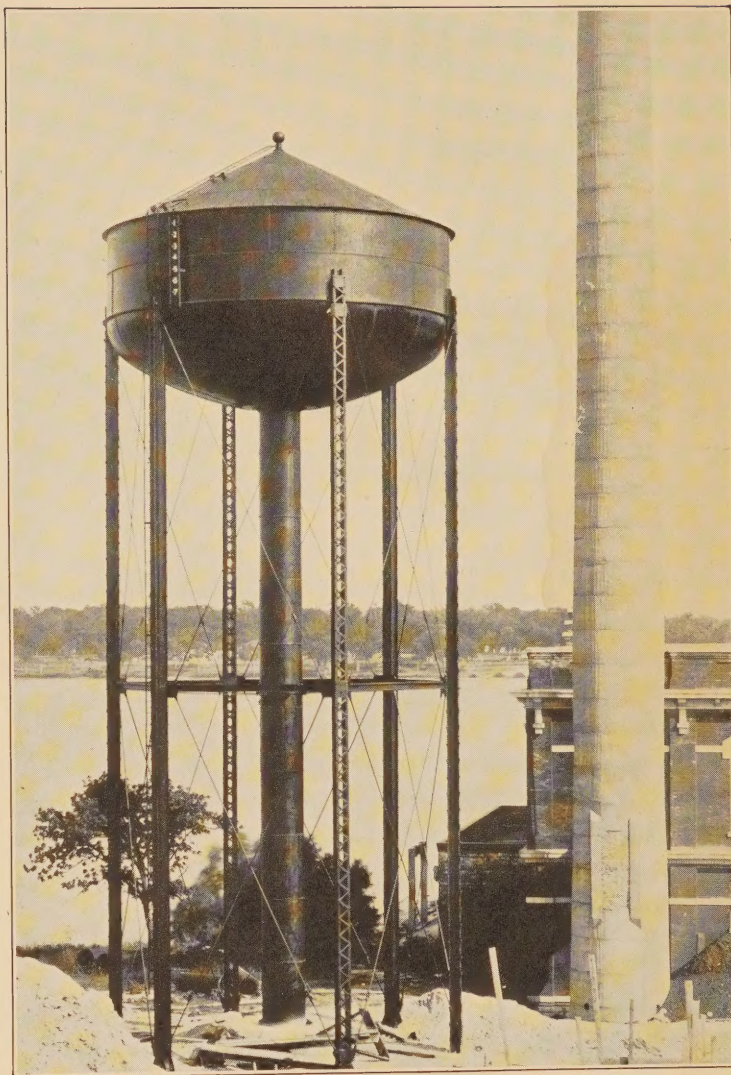


Filtration and Treatment

WATER TREATING PLANTS of all types, installed by the Pittsburgh-Des Moines Steel Company, are today giving satisfactory service to municipalities, public utilities, railroads and industries. When installing a treating plant, there is a decided advantage in placing the entire responsibility with one competent concern. Over forty years contracting experience in the water works field enables "Pittsburgh-Des Moines" to execute satisfactorily the difficult technical questions which arise as to design, location, capacity and construction. A representative will gladly make specific recommendations to take care of unusual requirements.

Steel Wash Water Tanks

The correct operation of a filter plant requires the proper quantity of water available at a suitable pressure, with as little variation in head as is practical. Most municipal filter plants require unusually low head ranges for the best service. A "Pittsburgh-Des Moines" shallow type elevated wash water tank will entirely satisfy this requirement. A "Pittsburgh-Des Moines" engineer will recommend a specially designed structure based on any special conditions.



WASH WATER ELEVATED TANK—DALLAS, TEXAS
(80,000 gallons)

Height to bottom.....	60 feet
Diameter.....	32 feet
Depth of water.....	16 feet, 2 inches
Riser diameter.....	4 feet

Steel Sedimentation Basins

Steel is a satisfactory, durable and economical material of which to construct sedimentation basins when the construction may be above ground. In underground installations it may be preferable in many cases to use concrete. The Pittsburgh-Des Moines Steel Company is prepared to quote on either type of construction.



FILTER PLANT, RONCEVERTE, W. VA.

This "Pittsburgh-Des Moines" plant has a daily capacity of 500,000 gallons per day.



PITTSBURGH-DES MOINES STEEL COMPANY



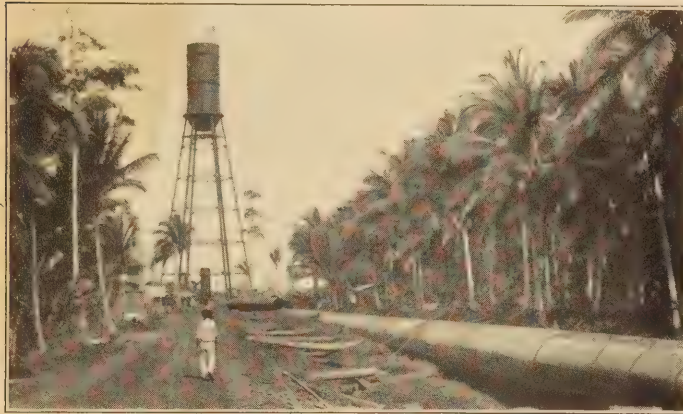


MODERN WATER STORAGE

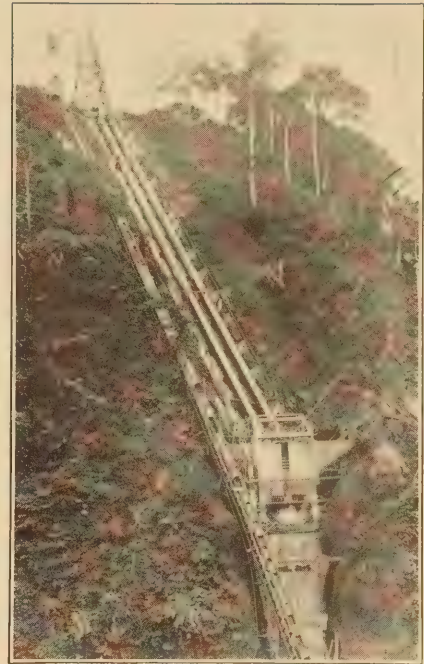


Hydroelectric Installations

HYDROELECTRIC plant installations call for a variety of specially fabricated steel work. Penstocks must be constructed to convey great quantities of water down steep cliffs and hillsides, sometimes for long distances. Highly fabricated structural steel is required to carry the heavy masonry and machinery of the power house. Surge tanks must be built to relieve the severe pressures set up in the penstocks by the closing of the gates. "Pittsburgh-Des Moines" can design and fabricate all of this steel for the particular conditions and requirements of your job, and "Pittsburgh-Des Moines" can erect it anywhere in the world.

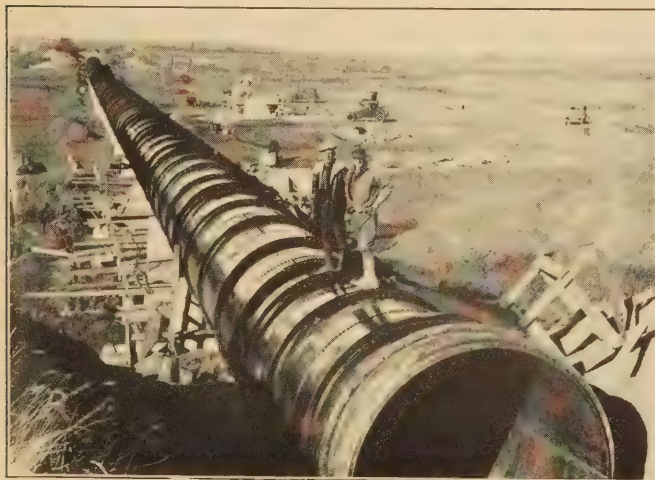


One terminal view of 2500 feet of 6 feet 6 inch riveted steel pipe leading to partly completed surge tank, installed in the summer of 1930 for the Manila Electric Railway and Light Company at Botocan Falls, Philippine Islands.



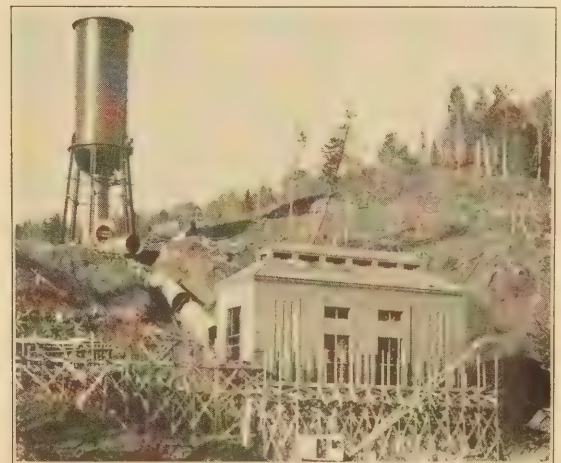
BOTOCAN FALLS, PHILIPPINE ISLANDS

Double penstocks each 4 feet 6 inches in diameter erected by "Pittsburgh-Des Moines" in the summer of 1930 for the Manila Electric Railway and Light Company. They convey water from the surge tank at top to the power house 700 feet below in the gorge. Four steel Tainter gates, 2500 feet of 78-inch steel pipe, a power house, and the surge tank were also included in this contract.



BELLE FOURCHE, SOUTH DAKOTA

Construction of "Pittsburgh-Des Moines" pipe line across the prairie.



ROCKLAND, MICHIGAN

Northern Acquisition Company Surge Tank and Power House

Height to bottom.....	46 feet
Diameter.....	32 feet
Depth of water.....	81 feet
Outside riser diameter.....	10 feet
Inside riser diameter.....	8 feet

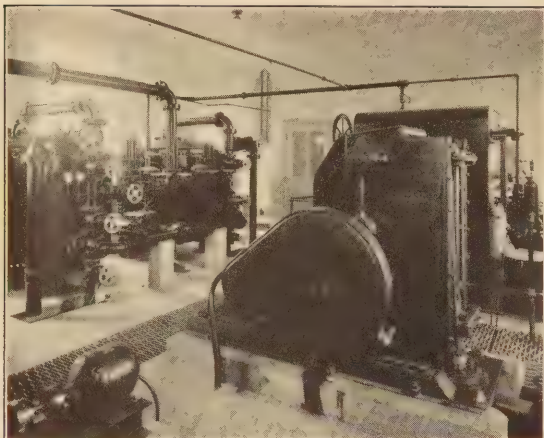


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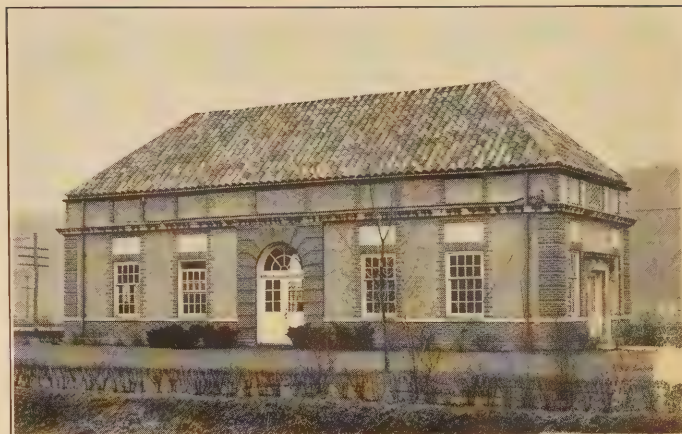




MODERN WATER STORAGE



Interior view of a "Pittsburgh-Des Moines" water treating plant completed in 1931 at Woodville, Ohio. (See below.) Filtering, softening and pumping equipment is shown.



Water pumping station erected in 1930 for the Edgeworth Water Co., Edgeworth, Pa.

GENERAL WATER



Exterior view of the "Pittsburgh-Des Moines" water plant at Woodville, Ohio. (See above.) A settling tank is shown at the left of the 100,000 gallon elevated tank.
Height to bottom..... 100 feet
Diameter..... 24 feet
Depth of water..... 31 feet

"PITTSBURGH-DES MOINES" service originated nearly forty years ago, serving municipalities in the construction of complete water works systems.

During recent years much of this construction has been for railroads, industries and federal and state governments. "Pittsburgh-Des Moines" installations can today be found over the entire United States and its many possessions. The experience and responsibility acquired in the slow process of building up a substantial and reliable business is available for the performance of such work as the construction of water mains, pumping plants, filtration or softening plants, foundations and other general water works construction.

When contemplating any class of water works construction, consult a "Pittsburgh-Des Moines" engineer who will gladly assist you in solving your problem. This special construction service is particularly valuable to purchasers of water storage tanks who wish to contract for the additional work required in connection with the water tank installation. Such work as concrete foundations, cutting into existing systems, running new mains, adding new pumping equipment and re-arranging present facilities, can be handled as a complete "Pittsburgh-Des Moines" contract. This avoids division of responsibility and places the entire job in the hands of one reliable concern.



PITTSBURGH-DES MOINES STEEL COMPANY



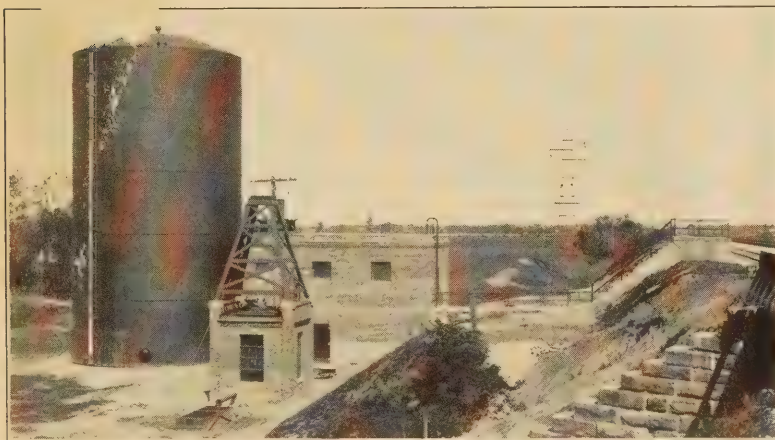


MODERN WATER STORAGE

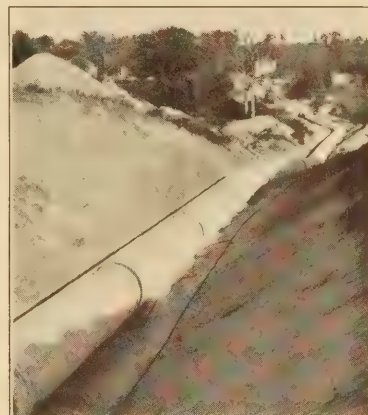


C. & O. RAILWAY CO., RUSSELL, KY.
Pumping station and intake from the Ohio River built by the Pittsburgh-Des Moines Steel Company

WORKS CONSTRUCTION



Railway water supply and treating plant for the Baltimore and Ohio Railroad Co. at Kellars, Ohio.



A section of 5 feet 6 inch riveted steel pipe line installed by "Pittsburgh-Des Moines" at Providence, R. I.



CITY WATER WORKS—MONROE, IOWA
Laying cast iron water mains.



MISSOURI PACIFIC R. R.—MARQUETTE, KAN.
Treating plant with 24 feet diameter, 45 feet high tank



PITTSBURGH • DES MOINES STEEL COMPANY





MODERN WATER STORAGE



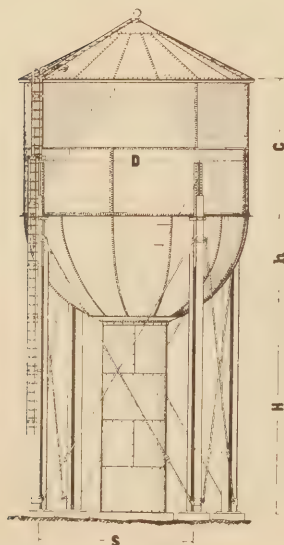
GREAT NORTHERN RAILWAY, WILLISTON, NORTH DAKOTA
(Two 100,000 gallon tanks)

Height to bottom..... 30 feet
Diameter..... 28 feet
Depth of water..... 23 feet, 2 inches

Hemispherical Bottom Tanks with Vertical Columns

TABLE I

"Pittsburgh-Des Moines" Hemispherical Bottom Tanks with Vertical Column Towers



Capacity U. S. Gallons	Tank Dimensions			No. of Col- umns	Height of Towers to Bottom of Tank Capacity					
	D	C	V							
20,000	15'-0"	10'-9"	16'-2"	4	15'-0"	20'-0"	25'-0"	30'-0"	35'-0"	40'-0"
25,000	15'-0"	14'-7"	19'-11"	4	15'-0"	20'-0"	25'-0"	30'-0"	35'-0"	40'-0"
30,000	17'-0"	12'-7"	19'-0"	4	15'-0"	20'-0"	25'-0"	30'-0"	35'-0"	40'-0"
40,000	19'-0"	13'-1"	20'-6"	4	15'-0"	20'-0"	25'-0"	30'-0"	35'-0"	40'-0"
50,000	21'-0"	13'-1"	21'-1"	4	15'-0"	20'-0"	25'-0"	30'-0"	35'-0"	40'-0"
60,000	24'-0"	10'-1"	20'-3"	4	15'-0"	20'-0"	25'-0"	30'-0"	35'-0"	40'-0"
75,000	24'-0"	15'-1"	23'-10"	4	15'-0"	20'-0"	25'-0"	30'-0"	35'-0"	40'-0"
100,000	28'-0"	13'-5"	23'-7"	4	15'-0"	20'-0"	25'-0"	30'-0"	35'-0"	40'-0"
150,000	28'-0"	14'-2"	24'-7"	4	15'-0"	20'-0"	25'-0"	30'-0"	35'-0"	40'-0"
200,000	36'-0"	15'-1"	29'-2"	6	15'-0"	20'-0"	25'-0"	30'-0"	35'-0"	40'-0"
250,000	38'-0"	17'-3"	33'-3"	6	15'-0"	20'-0"	25'-0"	30'-0"	35'-0"	40'-0"
300,000	38'-0"	23'-11"	38'-3"	6	15'-0"	20'-0"	25'-0"	30'-0"	35'-0"	40'-0"

Tower heights have been standardized for the capacities in the above table, and can thus be made to suit the requirements in each particular case. Where the height of tower required is comparatively low, this type of storage will be found economical.

Bold face type indicates tanks carried in stock, ready for prompt shipment. Designs are prepared on all the sizes listed so that reasonably rapid completion on any size selected may be made.

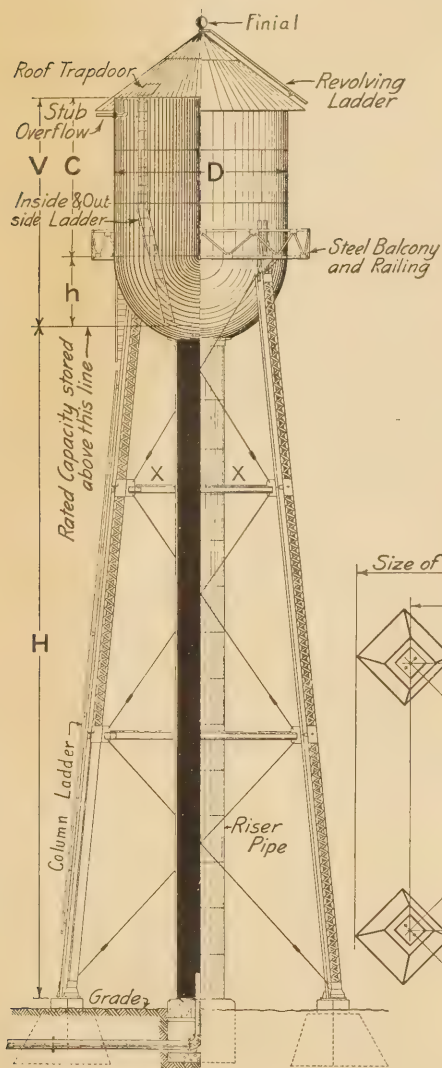


PITTSBURGH-DES MOINES STEEL COMPANY





"Pittsburgh-Des Moines" Standard Tank and Tower

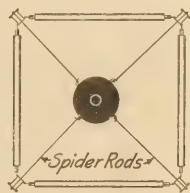


SECTIONAL VIEW | FRONT VIEW

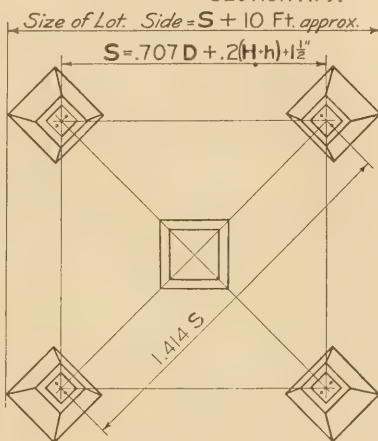
NOTE

To determine size of lot required for a specified size of tank and height of tower, take dimensions **D** and **h** from table of Standard Tanks; determine **(H)** and apply in formula below for **S**=spread between adjacent column centers at base. Special towers can be designed for restricted locations.

For sizes of tower members and thicknesses of tank plates, send for standard plan.



SECTION AT X



FOUNDATION PLAN

Accessories Which Can Be Furnished With Any "Pittsburgh-Des Moines" Elevated Tank

- *Ornamental Finial
- *Roof Swivel Ladder
- *Inside Tank Ladder
- *Outside Tank Ladder
- *Tower Ladder
- Painter's Trolley Inside of Tank
- **Steel Balcony with Handrail
- *3" Stub Overflow
- Overflow to Ground Level
- Visible Water Level Indicator
- Mercury Water Level Gauge
- Electric Water Level—Pump Control
- High-Low Alarm
- *Pipe Flanges
- *Large Diameter Steel Riser Pipe
- Small Diameter Steel Riser Pipe
- Expansion Joint for Small Riser
- Walkway for Inspection of Expansion
- Frost Case to enclose Small Riser
- *Base Elbow
- Base Tee
- 6" Blowoff Valve
- *Roof Hatch
- Handhole in Tank Bottom
- *Manhole in Steel Riser Pipe
- Heating Equipment for Fire Protection Tanks
- Obstacle Lights

Notes

*Items marked thus are standard equipment with all types of "Pittsburgh-Des Moines" Elevated Tanks, and are included if listed in the quotation.

Special equipment not listed above, but required in particular instances, can be furnished.

**Balconies are not furnished with vertical column towers, or with elevated tanks of less than 25,000 gallons capacity.



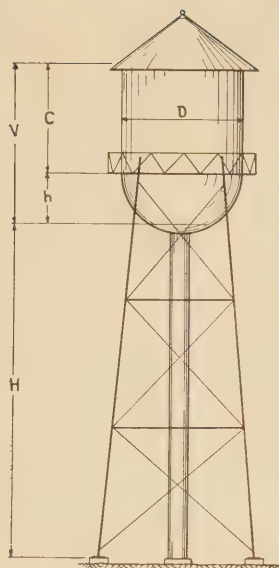


MODERN WATER STORAGE



Table II

"Pittsburgh Des-Moines" S



Capacity U. S. Gallons	TANK DIMENSIONS			No. of Columns	Two Panel Tower				Three Panel Tower
	D	C	V						
25,000	15'- 0"	14'- 7"	19'-11"	4	44'- 8"	50'- 0"	.....	69'- 8"	75'- 0"
30,000	15'- 0"	18'- 5"	23'- 9"	4	44'- 8"	50'- 0"	.....	69'- 8"	75'- 0"
40,000	17'- 0"	18'- 5"	25'- 1"	4	46'- 3"	.....	.....	.....	75'- 0"
50,000	19'- 0"	17'- 7"	25'- 7"	4	.....	55'- 0"	63'- 4"	75'- 0"	83'- 0"
60,000	19'- 0"	22'- 6"	30'- 6"	4	.....	55'- 0"	63'- 4"	75'- 0"	83'- 0"
75,000	21'- 0"	22'- 6"	30'- 6"	4	.....	55'- 0"	63'- 4"	75'- 0"	83'- 0"
100,000	24'- 0"	22'- 6"	31'- 0"	4	.....	50'- 0"	63'- 1"	75'- 0"	79'- 0"
150,000	28'- 0"	24'- 2"	34'- 7"	4	46'- 6"	54'-10"	63'- 2"	75'- 0"	83'- 0"
200,000	32'- 0"	23'- 4"	36'- 1"	6	45'- 9"	54'- 1"	62'- 5"	75'- 0"	83'- 0"
250,000	32'- 0"	31'- 4"	45'- 4"	6	45'- 4"	53'- 8"	62'- 0"	75'- 0"	83'- 0"
300,000	36'- 0"	28'- 4"	42'- 5"	6	45'- 4"	53'- 8"	62'- 0"	75'- 0"	83'- 0"
400,000	40'- 0"	30'- 0"	46'- 6"	8	44'- 6"	52'-10"	61'- 2"	75'- 0"	83'- 0"
500,000	44'- 0"	29'- 9"	49'- 2"	10	43'- 6"	51'-10"	60'- 2"	75'- 0"	83'- 0"
600,000	44'- 0"	38'- 6"	58'- 2"	10	63'- 1"	71'- 5"	79'- 9"	94'- 8"	103'- 0"
750,000	50'- 0"	34'- 9"	57'- 5"	12	65'- 3"	73'- 7"	81'-11"	97'-10"	106'- 0"
1,000,000	50'- 0"	52'- 0"	73'- 7"	10 or 14	64'- 6"	72'-10"	81'- 2"	96'- 9"	105'- 0"

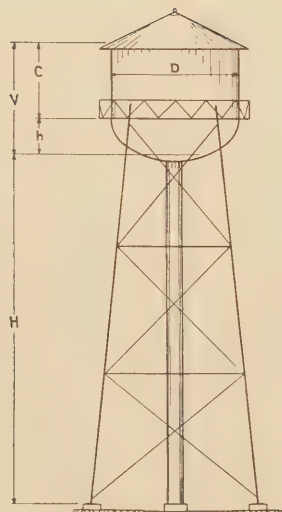
BOLDFACE TYPE indicates tanks and towers fabricated, and in stock ready for im

The above hemispherical bottom tan the most economical dimensions in the v ordinary requirements.

Although the head range between a tank for the larger capacity tanks may b installations, in most cases the capacity to give reserve for fire protection, shou excess of daily requirements and pumpi the actual range in head under operatin only a fraction of the maximum.

Table III

"Pittsburgh Des-Moines" Sta



Capacity U. S. Gallons	TANK DIMENSIONS			No. of Columns	Two Panel Tower				Three Panel Tower
	D	C	V						
25,000	17'- 0"	11'- 9"	15'- 5"	4	46'- 4"	51'- 8"	.....	71'- 4"	75'- 0"
30,000	17'- 0"	14'- 7"	18'- 6"	4	46'- 1"	51'- 5"	.....	71'- 1"	75'- 0"
40,000	21'- 0"	11'- 3"	16'- 9"	4	47'- 5"	.....	.....	.....	75'- 0"
50,000	22'- 0"	13'- 2"	19'- 0"	4	.....	57'- 2"	65'- 6"	75'- 0"	85'- 0"
60,000	24'- 0"	12'-10"	19'- 4"	4	.....	56'- 6"	64'-10"	75'- 0"	84'- 0"
75,000	26'- 0"	13'- 6"	20'- 8"	4	.....	55'-10"	64'- 2"	75'- 0"	84'- 0"
100,000	28'- 0"	16'- 2"	23'- 2"	4	.....	51'- 6"	64'- 7"	75'- 0"	81'- 0"
150,000	34'- 0"	14'-10"	25'- 0"	6	46'- 9"	55'- 1"	62'- 5"	75'- 0"	83'- 0"
200,000	38'- 0"	15'- 5"	27'- 0"	6	46'-11"	55'- 3"	63'- 7"	75'- 0"	84'- 0"
250,000	40'- 0"	18'- 1"	30'- 0"	6	47'- 5"	55'- 9"	64'- 1"	75'- 0"	85'- 0"
300,000	40'- 0"	23'-11"	34'- 0"	6	49'- 4"	57'- 8"	66'- 0"	75'- 0"	87'- 0"
400,000	46'- 0"	22'- 9"	34'-11"	8	48'-10"	57'- 2"	65'- 6"	75'- 0"	87'- 0"
500,000	50'- 0"	23'- 9"	37'- 0"	10	49'- 8"	58'- 0"	66'- 4"	75'- 0"	89'- 0"
600,000	55'- 0"	21'- 9"	39'- 7"	10	Tower heights have not been standardized.				
750,000	60'- 0"	22'- 4"	42'- 4"	12					
1,000,000	60'- 0"	35'- 0"	54'- 0"	14					
1,000,000	65'- 0"	26'- 1"	47'- 7"	16					
1,250,000	79'- 0"	17'- 4"	43'- 4"	20					
1,500,000	70'- 0"	37'- 8"	60'- 0"	20					
1,500,000	79'- 0"	24'- 0"	50'- 0"	20					
2,000,000	90'- 3"	22'- 6"	50'- 0"	28					

Tower heights have not been standardi

A "PITTSBURGH-DES MOINES" STANDARD TANK



MODERN WATER STORAGE



Standard Hemispherical Bottom Elevated Tanks

HEIGHT OF TOWERS TO BOTTOM OF TANK CAPACITY

1 Tower		Four Panel Tower						Five Panel Tower					
.....	.....	94'- 8"	100'- 0"	.....	.....	.....	.....	125'- 0"	.....	.....	.....	.....	.....
.....	.....	94'- 8"	100'- 0"	.....	.....	.....	.....	125'- 0"	.....	.....	.....	.....	.....
.....	.....	96'- 3"	100'- 0"	.....	.....	.....	.....	125'- 0"	.....	.....	.....	.....	.....
91'- 8"	100'- 0"	.....	111'- 8"	120'- 0"	128'- 4"	.....	.....	140'- 0"	148'- 4"	.....	.....	.....	.....
91'- 8"	100'- 0"	.....	111'- 8"	120'- 0"	128'- 4"	.....	.....	140'- 0"	148'- 4"	.....	.....	.....	.....
91'- 8"	100'- 0"	.....	111'- 8"	120'- 0"	128'- 4"	.....	.....	140'- 0"	148'- 4"	.....	.....	.....	.....
91'- 6"	100'- 0"	.....	113'- 1"	116'- 6"	125'- 0"	.....	.....	141'- 6"	153'- 5"	.....	.....	.....	.....
91'- 8"	100'- 0"	103'- 6"	111'-10"	120'- 2"	128'- 6"	136'-10"	.....	140'- 3"	148'- 7"	156'-11"	165'- 3"	173'- 7"	.....
91'- 8"	100'- 0"	104'- 3"	112'- 7"	120'-11"	129'- 3"	137'- 7"	.....	141'-10"	150'- 2"	158'- 6"	166'-10"	175'- 2"	.....
91'- 8"	100'- 0"	104'- 8"	113'- 0"	121'- 4"	129'- 8"	138'- 0"	.....	142'- 8"	151'- 0"	159'- 4"	167'- 8"	176'- 0"	.....
91'- 8"	100'- 0"	104'- 8"	113'- 0"	121'- 4"	129'- 8"	138'- 0"	.....	142'- 9"	151'- 1"	159'- 5"	167'- 9"	176'- 1"	.....
91'- 8"	100'- 0"	105'- 6"	113'-10"	122'- 2"	130'- 6"	138'-10"	.....	144'- 4"	152'- 8"	161'- 0"	169'- 4"	177'- 8"	.....
91'- 8"	100'- 0"	106'- 6"	114'-10"	123'- 2"	131'- 6"	139'-10"	.....	146'- 3"	154'- 7"	162'-11"	171'- 3"	179'- 7"	.....
11'- 4"	119'- 8"	126'- 3"	134'- 7"	142'-11"	151'- 3"	159'- 7"	.....	166'- 1"	174'- 5"	182'- 9"	191'- 1"	199'- 5"	.....
14'- 6"	122'-10"	130'- 5"	138'- 9"	147'- 1"	155'- 5"	163'- 9"	.....	171'- 5"	179'- 9"	188'- 1"	196'- 5"	204'- 9"	.....
13'- 5"	121'- 9"	129'- 0"	137'- 4"	145'- 8"	154'- 0"	162'- 4"	.....	169'- 7"	177'-11"	186'- 3"	194'- 7"	202'-11"	.....

shipment; other tanks and towers are partially fabricated and require only a small amount of work for completion.

igned with
capacities for

With automatic control of the pumps this can usually be adjusted to range only a few feet in the cylinder of the tank.

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When a low maximum head range is necessary the following series of ellipsoidal bottom tanks is available. These tanks are more useful for the larger capacities, but consideration should be given to the actual head range requirements under operating conditions as suggested above, in order to secure the most economical and practical installation.

Standard Hemi-ellipsoidal Bottom Elevated Tanks

HEIGHT OF TOWERS TO BOTTOM OF TANK CAPACITY

1 Tower		Four Panel Tower						Five Panel Tower					
.....	.....	96'- 4"	100'- 0"	.....	.....	.....	.....	126'- 8"	.....	.....	.....	.....	.....
.....	.....	96'- 1"	100'- 0"	.....	.....	.....	.....	126'- 5"	.....	.....	.....	.....	.....
.....	.....	97'- 5"	100'- 0"	.....	.....	.....	.....	126'- 2"	.....	.....	.....	.....	.....
3'-10"	100'- 0"	.....	113'-10"	122'- 2"	130'- 6"	.....	.....	142'- 2"	150'- 6"	.....	.....	.....	.....
3'- 2"	100'- 0"	.....	113'- 2"	121'- 6"	129'-10"	.....	.....	141'- 6"	149'-10"	.....	.....	.....	.....
2'- 6"	100'- 0"	.....	112'- 6"	120'-10"	129'- 2"	.....	.....	140'-10"	149'- 2"	.....	.....	.....	.....
3'- 0"	100'- 0"	.....	114'- 7"	118'- 0"	126'- 6"	.....	.....	143'- 0"	154'-11"	.....	.....	.....	.....
1'-11"	100'- 0"	103'- 9"	112'- 1"	120'- 5"	128'- 9"	137'- 1"	.....	140'- 6"	148'-10"	157'- 2"	165'- 6"	173'-10"	.....
2'-10"	100'- 0"	105'- 5"	113'- 9"	122'- 1"	130'- 5"	138'- 9"	.....	143'- 0"	151'- 4"	159'- 8"	168'- 0"	176'- 4"	.....
3'- 9"	100'- 0"	106'- 9"	115'- 1"	123'- 5"	131'- 9"	140'- 1"	.....	144'- 9"	153'- 1"	161'- 5"	169'- 9"	178'- 1"	.....
5'- 8"	100'- 0"	108'- 8"	117'- 0"	125'- 4"	133'- 8"	142'- 0"	.....	146'- 9"	155'- 1"	163'- 5"	171'- 9"	180'- 1"	.....
6'- 0"	100'- 0"	109'-10"	118'- 2"	126'- 6"	134'-10"	143'- 2"	.....	148'- 8"	157'- 0"	165'- 4"	173'- 8"	182'- 0"	.....
7'-10"	100'- 0"	112'- 8"	121'- 0"	129'- 4"	137'- 8"	146'- 0"	.....	152'- 5"	160'- 9"	169'- 1"	177'- 5"	185'- 9"	.....

these capacities, and can thus be made to suit the requirements in each particular case.

THE BEST SOLUTION OF YOUR STORAGE PROBLEM



MODERN WATER STORAGE



Small Capacity Tank with Angle Column Tower



PITTSBURGH, PA.—DAVISON COKE AND IRON COMPANY
(10,000 gallons)

Height to bottom..... 40 feet
Diameter..... 13 feet
Depth of water..... 11 feet, 10 inches

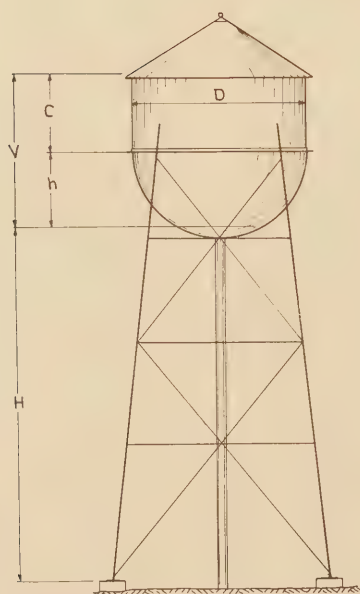


TABLE IV—"PITTSBURGH-DES MOINES" SMALL CAPACITY TANKS
WITH ANGLE COLUMN TOWERS

Capacity U. S. Gallons	Tank Dimensions			Tower Heights 4 Column Design
	D	C	V	
5,000	9' 0"	10' 0"	11' 3"	{Any height in multiples of 7 feet up to 98 feet. Any height in multiples of 10 feet up to 100 feet.
10,000	13' 0"	5' 11"	11' 11"	
15,000	13' 0"	10' 11"	16' 11"	
20,000	13' 0"	15' 11"	21' 11"	

In many instances it is desirable to provide a limited quantity of elevated storage, and, where it is reasonably certain that additional storage will not be necessary for some time to come, one of these elevated tanks will satisfactorily meet this requirement. The same equipment is included with these tanks as with a larger structure.



PITTSBURGH · DES MOINES STEEL COMPANY





MODERN WATER STORAGE



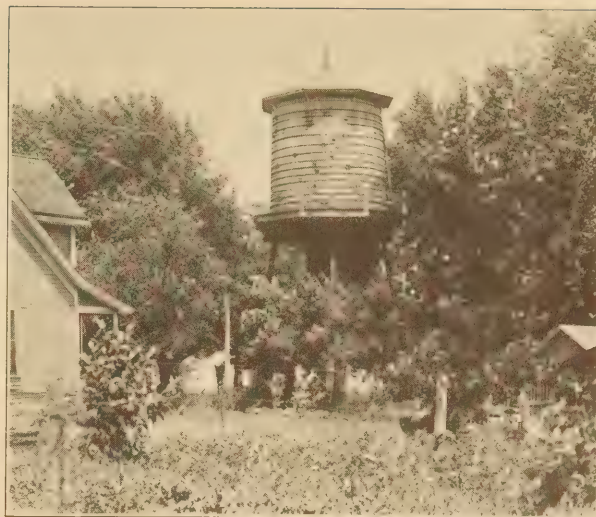
Experience is Required to Build a Good Elevated Tank

SINCE the construction of its first elevated *wood* tank for the town of Union, Iowa in 1893, this organization has made a specialty of the manufacture and erection of water storage tanks and in this time has constructed thousands of these structures. Those who know, realize that the design, manufacture and erection of tanks and towers is a highly specialized business requiring a thorough knowledge of design, skill in manufacture, and experience in erection, for the safe and satisfactory completion of the installation.

The Pittsburgh-Des Moines Steel Company plants are located at Des Moines, Iowa and Pittsburgh, Pennsylvania. Both of these large plants are modern in every respect and completely equipped with adequate machinery to produce the finest of shop work. In these shops special machinery of the most modern design

has been developed by our engineers. Structural members are laid out, holes punched, ends carefully milled, and all members are finished with an accuracy not ordinarily found in similar work. Plates are drilled with multiple drills or punched with automatic spacing machines, and curved bottom plates are formed without distortion or injury by means of huge hydraulic presses especially designed for this purpose.

The Pittsburgh-Des Moines Steel Company maintains a large number of skilled and experienced erection crews scattered at strategic points in the territories tributary to its principal offices to give speedy erection with the best possible service to customers.

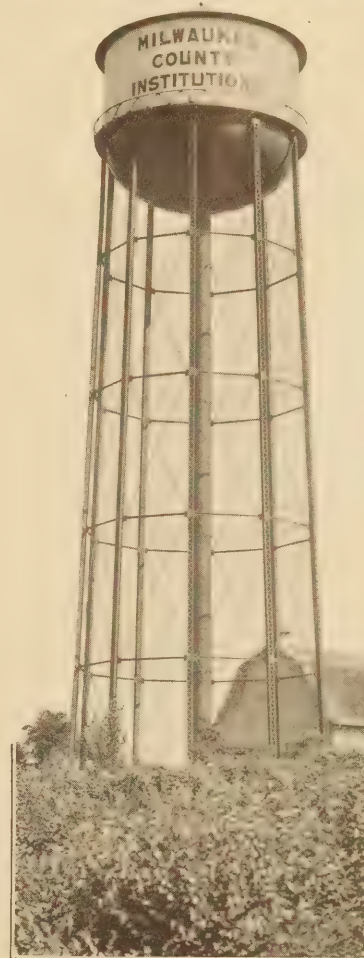


First elevated tank erected by "Pittsburgh-Des Moines" at Union, Iowa in 1893.



BAKERSFIELD, CALIFORNIA
California Water Service Company
(250,000 gallons)

Height to bottom.....	65 feet
Diameter.....	40 feet
Depth of water.....	30 feet



MILWAUKEE COUNTY
INSTITUTIONS, WISCONSIN
(500,000 gallons)

Height to bottom....	171 feet 3 inches
Diameter.....	50 feet
Depth of water.....	40 feet 5 inches



PITTSBURGH-DES MOINES STEEL COMPANY

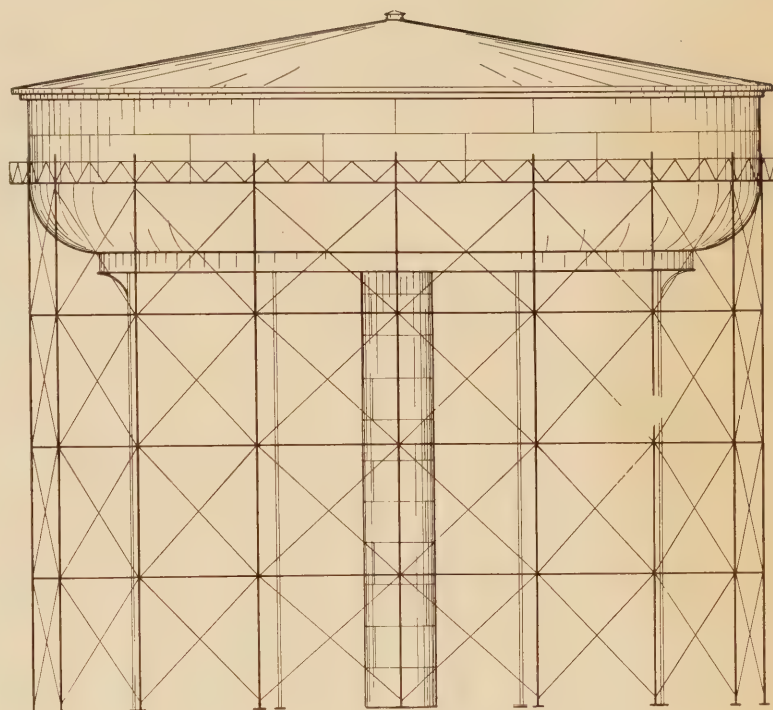




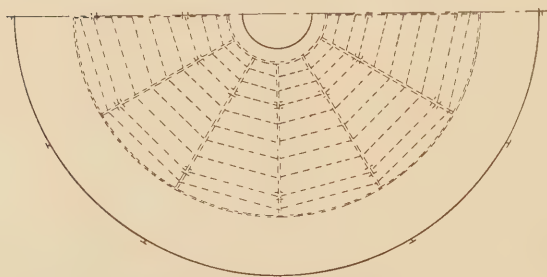
Large Tanks with Low Ranges of Pressure

To economically meet the requirements for large capacity elevated steel tanks with unusually low head range the Pittsburgh-Des Moines Steel Company has developed the new "Torroidal" bottom tank shown at right.

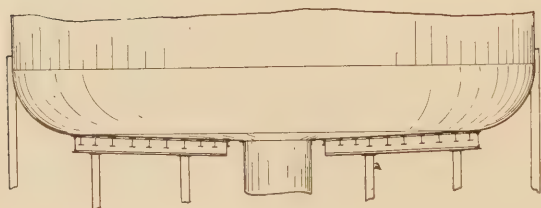
Modern use of elevated tanks by municipalities to furnish storage capacity to take care of the peak demand during certain hours of the day at points where the entire tank may be emptied within a few hours, has emphasized the requirements for unusually shallow tanks with low head range between a full and an empty tank.



TYPICAL DESIGN
TORROIDAL BOTTOM ELEVATED TANK



HALF PLAN OF BOTTOM SHOWING GRILLAGE



SECTION A-A
SECTIONAL VIEW

This design combines the principle of the suspended bottom for the outer circle of bottom plates, which are dished without distortion by hydraulic pressure to a comparatively large radius, with a central circular portion of continuous plate, either of riveted or welded construction, supported by deck beams, radial girders and internal columns.

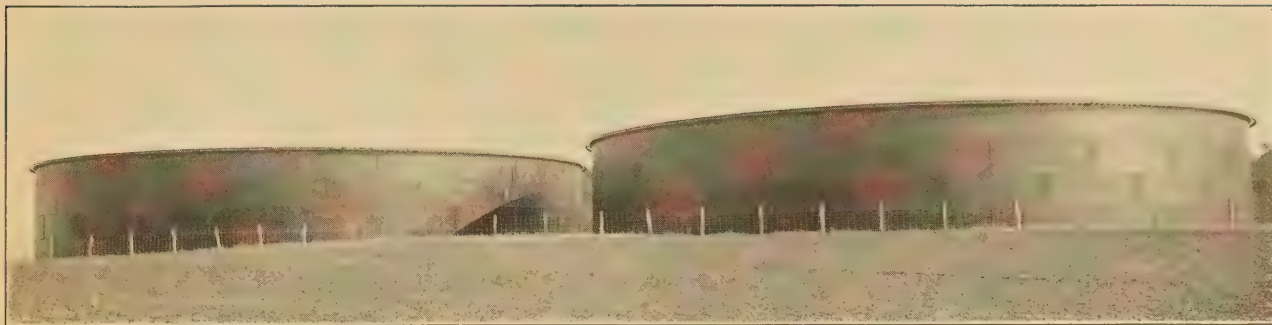
The contour of this tank is simple and pleasing to the eye and the cross section is uniform. The inside of the tank is free from sediment-collecting pockets, and drains directly to the center riser connection.

This type is recommended for installations where hemispherical or ellipsoidal bottomed tanks of standard dimensions do not fulfill the requirements for an unusually low head range.





MODERN WATER STORAGE

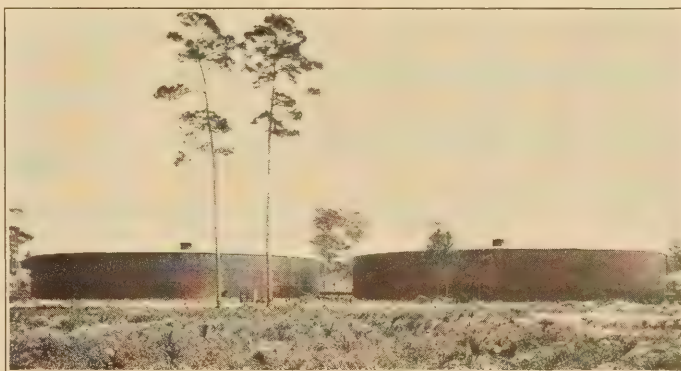


BERRYVILLE, VIRGINIA
(Two 3,000,000 gallon reservoirs)

Height..... 24 feet, 8 inches
Diameter..... 144 feet

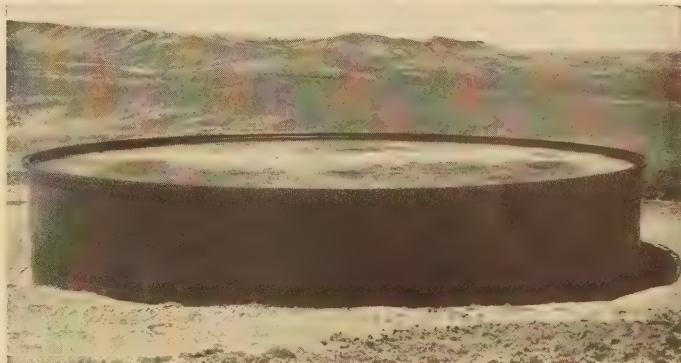
Steel Reservoirs for Natural Elevations

THE PITTSBURGH-DES MOINES STEEL COMPANY will design and build a tank to fit your requirements to the best advantage, but for cases where pressure is not a factor, standard PDM tanks have been designed. The most economical proportions have been selected. These tanks are built either with or without steel roofs. Tanks of this type are frequently used for impounding a water supply, water being pumped from the impounding tank to the elevated storage tank. Costs are surprisingly low . . . often cheaper than that of a dam to impound an equal amount of water . . . usually as cheap as a masonry-lined excavated reservoir.



MIAMI, FLORIDA
(Two 2,500,000 gallon reservoirs)

Height..... 20 feet
Diameter..... 146 feet



RAWLINS, WYOMING
(2,000,000 gallon reservoir)

Height..... 23 feet, 3 inches
Diameter..... 117 feet

TABLE V

"Pittsburgh-Des Moines" Standard Reservoir Tanks

Capacity	Diameter	Height
50,000 gallons	24'-0"	15'- 1"
75,000 "	24'-0"	22'- 6 $\frac{1}{4}$ "
100,000 "	30'-0"	19'- 3"
125,000 "	30'-0"	24'- 0"
150,000 "	36'-0"	20'- 0 $\frac{1}{4}$ "
175,000 "	36'-0"	23'- 3 $\frac{3}{4}$ "
200,000 "	36'-0"	26'- 7 $\frac{3}{4}$ "
300,000 "	42'-0"	29'- 3 $\frac{3}{4}$ "
400,000 "	42'-0"	39'- 0 $\frac{3}{4}$ "
500,000 "	48'-0"	37'- 4 $\frac{1}{2}$ "
600,000 "	60'-0"	28'- 9 $\frac{1}{4}$ "
700,000 "	72'-0"	24'-11 $\frac{7}{8}$ "
1,000,000 "	84'-0"	24'- 5 $\frac{3}{4}$ "
1,500,000 "	96'-0"	28'- 0 $\frac{7}{8}$ "
2,000,000 "	120'-0"	23'-11 $\frac{7}{8}$ "
2,500,000 "	132'-0"	24'- 9 $\frac{1}{4}$ "
3,000,000 "	144'-0"	24'-11 $\frac{3}{4}$ "
4,000,000 "	168'-0"	24'- 5 $\frac{1}{4}$ "



PITTSBURGH • DES MOINES STEEL COMPANY





STANDPIPES AND



BURLINGTON, IOWA
(954,000 gallons)

Height..... 65 feet
Diameter..... 50 feet

EVERYONE is familiar with the old fashioned "smokestack" type of steel standpipe. Many towns still possess these structures, which, small in diameter, rise above the surrounding flat country . . . one hundred feet or more . . . like a smoke stack. They are not unusually economical for the elevated storage of water. Only a small portion of the water stored in such a standpipe is available at or near the maximum elevation of the structure. The development of the hemispherical bottom elevated tank quickly brought the realization that it is more economical to elevate water on steel columns than on a column of water.

However, where nature can provide a sufficient elevation to permit the use of economical proportions, a standpipe or flat bottom tank can be used to provide all the benefits of elevated storage quite as effectively as an elevated tank. As no tower is required, the cost per gallon of storage is considerably cheaper, although the saving is usually reduced by the additional pipe line that is required to reach the natural elevation.

The Pittsburgh-Des Moines Steel Company builds steel tanks of any capacity from 5,000 gallons to 4,000,000 gallons, with steel roofs or with open top, all properly designed, well fabricated, and put together in the field by experienced workmen. A word sent to the nearest office will bring an engineer competent to select and quote on a structure which will suit your particular conditions and give you maximum value for your water storage dollars.

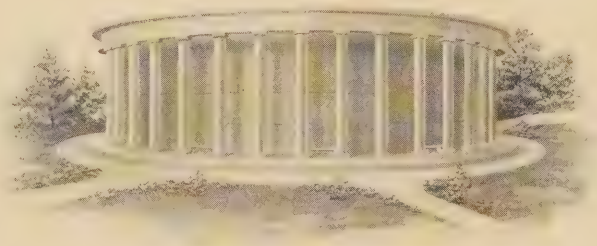
A "Pittsburgh-Des Moines" Tank is Safe

It is built of plates of open hearth steel from the best steel mills in the world. Modern manufacturing methods and tests on every batch of steel rolled give this material an unusual uniformity. Nearly forty years of design experience and the use of definite and proved formulas make it possible to determine exactly the plate thickness and riveting required for any given water tank, and **you get from four to five times the strength required to withstand failure.**



STATE COLLEGE, PA.
(1,000,000 gallons)

Height..... 70 feet
Diameter..... 50 feet



A suggestion for the artistic architectural and landscape treatment of a
"Pittsburgh-Des Moines" Tank





MODERN WATER STORAGE



FLAT BOTTOM TANKS

A "Pittsburgh-Des Moines" Tank is Permanent

WHEN your tank has been tested water tight and turned over to you, you may be sure it will stay that way. It cannot rot, burn or decay. It is immune to the action of frost, the greatest enemy of masonry reservoirs. Settlement of the supporting ground will not start leaks in the flexible water tight bottom.

A "Pittsburgh-Des Moines" Tank Relieves You of Responsibility

It is sold with a definite guarantee against defects in design, workmanship and materials. It is not necessary to make daily inspections as the work progresses nor constant tests of materials. The Pittsburgh-Des Moines Steel Company takes this responsibility from your shoulders. Your responsibility for foundation conditions is greatly reduced. A foundation settlement which would have no effect on a steel tank could seriously damage a masonry structure.

A "Pittsburgh-Des Moines" Tank is Adaptable

You can get one to give you exactly the pressure you want, to balance with an existing reservoir, or to suit the ground you have available. It can be erected in winter as well as in summer. You can add to the height of it later if you wish. It can be taken down and re-erected in another location if necessary.

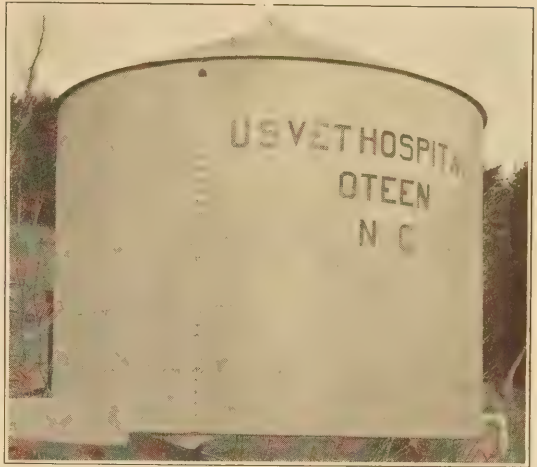
A "Pittsburgh-Des Moines" Tank is Easy to Maintain

All it needs is a coat of paint every few years, about as often as your house or barn, and it is a lot easier to put it on the tank. The Pittsburgh-Des Moines Steel Company is always glad to quote on the job complete, or will sell you the proper quantity and kind of paint, or you can get your local painter to handle the job. You can keep a steel tank in first class shape indefinitely without the services of experts but you need plenty of them when a masonry reservoir or tank starts to go bad under the influence of frost and weather.

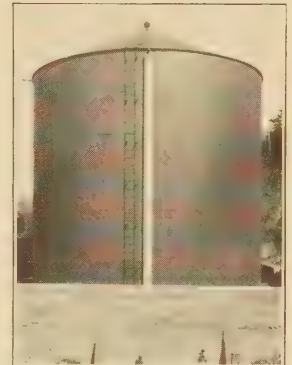
A "Pittsburgh-Des Moines" Tank is Economical

You will find that the first cost is surprisingly low, particularly for the larger capacities. Except for comparatively high tanks, foundation costs are very low because a steel tank weighs only about one-eighth to one-tenth as much as one of masonry. This also is a big advantage where the site is difficult of access as the weight of material to be moved is so much less.

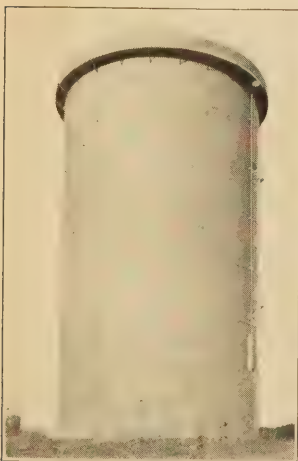
Drop a line to the nearest Pittsburgh-Des Moines Steel Company office before you contract for a reservoir or tank of any material. An engineer will gladly call, look over your situation and quote on a tank to meet your requirements, all without placing you under any obligation whatever.



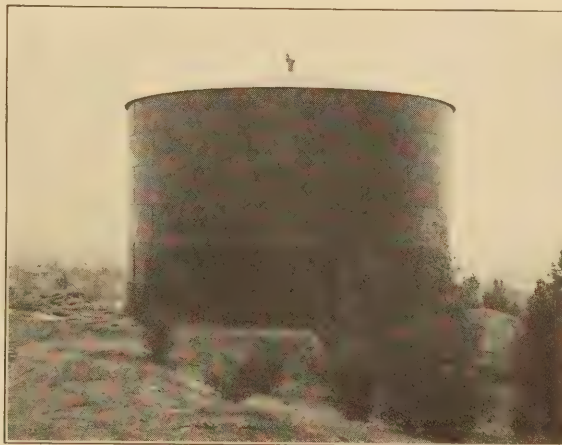
OTEEN, N. C.
U. S. Veterans Base
Hospital
(400,000 gallons)
Height..... 34 feet
Diameter..... 45 feet



RONCEVERTE, W. VIRGINIA
(250,000 gallons)
Height..... 33 feet
Diameter..... 36 feet
(This tank was erected inside a defective concrete reservoir for less than the cost of repairing the reservoir.)



WALTHAM, MASS.
(1,250,000 gallons)
Height..... 84 feet
Diameter..... 50 feet



DICKINSON, N. DAKOTA
(846,000 gallons)
Height..... 40 feet
Diameter..... 60 feet



MANHATTAN, KANSAS
A Special Ornamental Design
(300,000 gallons)
Height..... 56 feet
Diameter..... 31 feet



PITTSBURGH-DES MOINES STEEL COMPANY





The Care of Steel Tanks



SCRANTON, IOWA
The first steel tank erected by
"Pittsburgh-Des Moines" in
1897 is still in service for
Scranton's water works.

HERE is a picture of the first elevated *steel* tank built by this organization. It is a 40,000 gallon tank on a 100 foot tower built in 1897 for the water works at Scranton, Iowa, and is still giving good service. A steel tank properly cared for is a permanent installation.

The question of the painting of steel tanks is a subject to which this company has given and is giving a great deal of study and investigation. There is an almost unlimited number of paints on the market, many of which have considerable merit for various special uses, but for general use for water storage tanks we recommend and use for standard structures a shop coat of a lead base paint, a field coat inside of a water resisting paint made of a good grade of bakelite varnish and on the outside a coat of paint of black, green color as desired.

While climatic conditions and character of water stored have varying effects on the paint and length of service of such coating, experience shows that these structures should be inspected at least every three years. The Pittsburgh-Des Moines Steel Company is prepared to give this service, and after inspection, if the structure needs painting, will, for a reasonable sum, furnish materials and do this work with an experienced crew.



CORAOPOLIS, PA.
Felician Sisters of Pennsylvania
(150,000 gallons)

Height to bottom..... 120 feet, 2 inches
Diameter..... 28 feet
Depth of water..... 34 feet, 7 inches



SAN PEDRO, CALIF.
(500,000 gallons)

Height to bottom..... 100 feet
Diameter..... 44 feet
Depth of water..... 49 feet, 2 inches



PITTSBURGH-DES MOINES STEEL COMPANY





MODERN WATER STORAGE



Replacement Jobs by "Pittsburgh-Des Moines"



RICEVILLE, IOWA

Old tower height..... 75 feet
New tower height..... 100 feet

The lower part of these "Pittsburgh-Des Moines" steel towers formerly supported wooden tanks which were replaced with modern hemispherical bottom steel tanks. Often the tank capacity may be increased or the tower height increased, as shown by the top panels of these towers.



This 250,000 gallon tank was erected in 1907 at Sterling, Colorado, the original tower height being 95 feet. Twenty years later the tower was extended 15 feet, using the original tank, 34 feet in diameter by 26 feet high.



MARION, SOUTH DAKOTA

(50,000 gallons)

An old wood tank on the old steel tower 49 feet high was replaced by the above steel tank on an added new tower 34 feet high—making the completed tower 83 feet to the balcony.



PITTSBURGH • DES MOINES STEEL COMPANY





MODERN WATER STORAGE



Useful Information

1 cubic foot of water @ 62°F.....	Weights 62.36 pounds
1 U. S. gallon of water @ 62°F.....	Weights 8.33 pounds
1 U. S. gallon.....	= .231 cubic inches
1 U. S. gallon.....	= 0.13367 cubic feet
1 cubic foot.....	= 7.48 U. S. gallons
1 Imperial gallon.....	= 1.2003 U. S. gallons
1 litre.....	= 3.78 U. S. gallons
1 cubic meter.....	= 264.2 U. S. gallons
1 foot depth of water @ 62°F.....	= 0.433 pounds (per square inch) pressure
1 pound (per square inch) pressure.....	= 2.309 feet depth of water
1 horsepower.....	= 550 foot pounds per second
1 horsepower.....	= 33,000 foot pounds per minute
1 kilowatt.....	= 1,000 watts
1 kilowatt.....	= 1.341 horsepower
1 horsepower.....	= 0.7457 kilowatts
1 cubic inch cast iron.....	Weights 0.260 pounds
1 cubic foot cast iron.....	Weights 450 pounds
1 cubic inch steel.....	Weights 0.2835 pounds
1 cubic foot steel.....	Weights 490 pounds
1 cubic foot cement (1 bag).....	Weights 90 pounds
1 cubic yard sand.....	Weights 2700 pounds approx.
1 cubic yard gravel.....	Weights 2700 pounds approx.
1 cubic foot common brick.....	Weights 120 pounds approx.
1000 brick.....	Weigh 5300 pounds approx.

Formulas for Calculating Areas and Volumes

π	= 3.1416
Circumference of circle.....	= Diameter $\times \pi$
Area of circle.....	= Radius ² $\times \pi$
Area of sphere.....	= 4 $\times$ radius ² $\times \pi$
Volume of sphere.....	= $\frac{1}{6} \times$ diameter ³ $\times \pi$
Area of PDM hemi-ellipse.....	= 1.237 $\times$ (diameter of tank) ²
Volume of PDM hemi-ellipse.....	= 0.17431 $\times$ (diameter of tank) ³
Area of cone or pyramid.....	= Perimeter of base $\times \frac{1}{2}$ slant height
Volume of cone or pyramid.....	= Area of base $\times \frac{1}{3}$ of height perpendicular to base
Area of frustum of cone or pyramid.....	= (Perimeter of base + perimeter of top) $\times \frac{1}{2}$ slant height
Volume of frustum of cone or pyramid.....	= (Area of base + area of top + $\sqrt{\text{area of base} \times \text{area of top}}$) $\times \frac{1}{3}$ of height perpendicular to base

Recommended Bearing Values of Soils In Tons Per Square Foot for Average Conditions

Ordinary clay or sand.....	= 2
Compact dry clay or coarse sand.....	= 4
Compact sand and gravel.....	= 5
Shale rock.....	= 8
Hard rock.....	= 20

Ratios Used In Water Analysis

1 part per million.....	= 8.3 lbs. per 1,000,000 gallons
1 grain per gallon.....	= 143 lbs. per 1,000,000 gallons
1 grain per gallon.....	= 17.13 parts per million

Table VI—Fire Flows Required For Towns of Various Sizes, by National Board of Underwriters

Population	Required Fire Flow, Gallons per Minute for Average City	Population	Required Fire Flow, Gallons per Minute for Average City
1,000	1,000	28,000	5,000
2,000	1,500	40,000	6,000
4,000	2,000	60,000	7,000
6,000	2,500	80,000	8,000
10,000	3,000	100,000	9,000
13,000	3,500	125,000	10,000
17,000	4,000	150,000	11,000
22,000	4,500	200,000	12,000

Over 200,000 population, 12,000 gallons a minute, with 2,000 to 8,000 gallons additional for a second fire.

IN RESIDENTIAL DISTRICTS—The required fire flow depends upon the character and congestion of the buildings. Sections where buildings are small and of low height and with about $\frac{1}{4}$ the lots in a block built upon, require not less than 500 gallons a minute; with larger or higher buildings up to 1,000 gallons is required, and where the district is closely built, or buildings approach the dimension of hotels or high value residences, 1,500 to 3,000 gallons is required, with up to 6,000 gallons in densely built sections of 3-story buildings.

Table VII—Characteristics of Fire Streams

Pounds Pressure at Nozzle	Gallons Discharge Per Minute	Pounds Pressure Lost in each 100' of 2 1/2" Hose	Vertical Distance of Fire Streams (Feet)	Horizontal Distance of Fire Streams (Feet)
3/8" SMOOTH NOZZLE				
20	70	1.4	33	35
30	86	1.8	49	41
40	100	2.3	60	44
50	112	2.9	67	50
60	122	3.3	72	54
75	137	4.2	78	60
100	158	5.5	83	68
7/8" SMOOTH NOZZLE				
20	98	2.2	34	36
30	120	3.2	50	44
40	138	4.2	62	49
50	155	5.2	70	55
60	170	6.4	75	60
75	191	8.0	82	67
100	221	11.0	89	75
1" SMOOTH NOZZLE				
20	126	3.5	35	
30	154	5.2	51	
40	178	7.0	64	
50	198	8.7	73	
60	217	10.5	79	
75	243	13.3	87	
100	281	17.6	96	
1 1/8" SMOOTH NOZZLE				
20	161	5.7	36	38
30	197	8.7	52	50
40	227	11.8	65	59
50	254	14.8	75	66
60	278	17.3	83	72
75	310	21.5	90	79
100	361	29.5	99	89
1 1/4" SMOOTH NOZZLE				
20	196	8.6	37	40
30	241	13.2	53	54
40	278	17.3	67	63
50	310	21.5	77	70
60	340	26.1	85	76
75	380	32.4	93	83
100	439	43.7	101	93
1 3/8" SMOOTH NOZZLE				
20	238	13.0	38	42
30	291	18.9	54	58
40	335	25.2	69	66
50	375	31.6	79	73
60	412	38.2	87	79
75	460	48.0	95	86
100	531	63.7	103	96

The horizontal and vertical distances are for fair fire streams under average conditions. The extreme distance reached is from 15 percent to 45 percent greater than those indicated in the above table, but the stream will be broken into spray or large drops.



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MODERN WATER STORAGE



Table VIII—Friction of Water in Pipes. Loss of Head in Feet Due to Friction per 100 Feet of 15-Year-Old Ordinary Cast Iron Pipe

Gal. per Min.	4 In. Pipe		5 In. Pipe		6 In. Pipe		8 In. Pipe		10 In. Pipe		12 In. Pipe		14 In. Pipe		15 In. Pipe		16 In. Pipe		20 In. Pipe	
	Vel.	Fric.	Vel.	Fric.	Vel.	Fric.	Vel.	Fric.	Vel.	Fric.	Vel.	Fric.	Vel.	Fric.	Vel.	Fric.	Vel.	Fric.	Vel.	Fric.
40	1.02	0.22																		
45	1.17	0.28																		
50	1.28	0.34																		
70	1.79	0.63	1.14	0.21																
75	1.92	0.73	1.22	0.24																
100	2.55	1.22	1.63	0.41	1.14	0.14														
120	3.06	1.71	1.96	0.58	1.42	0.25														
125	3.19	1.86	2.04	0.64	1.48	0.28														
150	3.84	2.55	2.45	0.88	1.71	0.32														
175	4.45	3.44	2.86	1.18	2.00	0.48														
200	5.11	4.40	3.27	1.48	2.28	0.62														
225	5.77	5.45	3.67	1.86	2.57	0.74														
250	6.40	6.72	4.08	2.24	2.80	0.92	1.60	0.22												
270	6.90	7.70	4.42	2.60	3.03	1.13	1.70	0.25												
275	7.03	7.99	4.50	2.72	3.06	1.15	1.73	0.27												
300	7.66	9.30	4.90	3.14	3.40	1.29	1.90	0.32												
350	8.90	12.32	5.72	4.19	3.98	1.75	2.20	0.42												
400	10.21	16.00	6.54	5.40	4.54	2.21	2.60	0.54												
450	11.50	19.80	7.35	6.70	5.12	2.65	2.92	0.68	1.80	0.21										
470	12.10	22.40	7.70	7.22	5.49	2.90	3.07	0.75	1.92	0.24										
475	12.20	22.96	7.76	7.42	5.55	2.95	3.10	0.76	1.94	0.25										
500	12.77	24.00	8.17	8.12	5.60	3.30	3.20	0.82	2.04	0.28	1.42	0.11								
550			8.99	9.60	6.16	3.93	3.52	0.97	2.25	0.33	1.57	0.14								
600			9.80	11.30	6.72	4.70	3.84	1.14	2.46	0.39	1.71	0.15								
650			10.62	13.20	7.28	5.40	4.16	1.34	2.66	0.46	1.85	0.19	1.37	0.09						
700			11.44	15.10	7.84	6.20	4.46	1.54	2.86	0.52	2.00	0.22	1.47	0.10						
750			12.26	17.20	8.50	7.00	4.80	1.74	3.06	0.59	2.13	0.24	1.58	0.11						
800					9.08	8.00	5.12	1.97	3.28	0.67	2.27	0.27	1.68	0.13						
850					9.58	8.95	5.48	2.28	3.48	0.75	2.41	0.31	1.79	0.14						
900					10.30	10.11	5.75	2.46	3.68	0.83	2.56	0.34	1.89	0.16						
950					10.72	10.80	6.06	2.87	3.88	0.91	2.70	0.38	2.00	0.18	1.73	0.12				
1000					11.32	12.04	6.40	3.02	4.08	1.01	2.84	0.41	2.10	0.19	1.82	0.14				
1100					11.90	13.30	6.70	3.21	4.29	1.09	2.98	0.44	2.20	0.22	1.91	0.16				
1150					12.50	14.31	7.03	3.51	4.50	1.20	3.13	0.49	2.31	0.23	2.00	0.17				
1200					12.95	15.60	7.35	3.84	4.71	1.34	3.27	0.53	2.42	0.25	2.09	0.18				
1250					13.52	16.69	7.67	4.15	4.91	1.46	3.41	0.57	2.52	0.26	2.18	0.19				
1300					14.10	18.50	8.00	4.45	5.11	1.51	3.55	0.62	2.63	0.29	2.28	0.20	1.99	0.15		
1400							9.60	6.27	6.10	2.09	4.20	0.85	3.15	0.39	2.73	0.28	2.39	0.21		
1500							12.70	10.71	8.10	3.65	5.60	1.43	4.20	0.66	3.64	0.54	3.19	0.39		
1600									10.10	5.33	7.00	2.28	5.25	1.01	4.55	0.72	3.99	0.56		
1700									12.10	7.80	8.40	3.15	6.30	1.47	5.46	1.12	4.79	0.80	3.08	0.27
1800									14.10	10.08	9.80	4.10	7.35	1.81	6.37	1.43	5.59	1.04	3.59	0.35
1900											11.35	5.32	8.40	2.47	7.28	1.85	6.38	1.34	4.10	0.45
2000											11.93	6.00	8.82	2.80	7.64	2.08	6.72	1.45	4.32	0.50
2100											12.78	6.90	9.45	3.22	8.19	2.23	7.20	1.65	4.62	0.56
2200											14.20	8.40	10.50	3.92	9.10	2.78	7.96	2.02	5.13	0.68
2300													11.55	4.65	10.01	3.30	8.78	2.39	5.64	0.82
2400													12.60	5.50	10.92	3.90	9.56	2.60	6.15	0.96
2500													13.65	6.45	12.74	4.55	10.36	3.32	6.66	1.06
2600													14.70	7.15	14.70	5.08	11.12	3.68	7.18	1.28
2700															13.10	5.45	11.50	3.96	7.38	1.35
2800															13.65	5.90	11.95	4.28	7.66	1.45
2900																			8.17	1.63
3000																			8.68	1.83
3100																			9.20	2.04
3200																			9.70	2.23
3300																			10.40	2.53
3400																				
3500																				
3600																				
3700																				
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MODERN WATER STORAGE



*Table XI—American Water Works Association Standard Bell and Spigot Cast Iron Pipe

Nominal Inside Diameter of Pipe	CLASS A 100 Feet Head 43 Lbs. Pressure				CLASS B 200 Feet Head 86 Lbs. Pressure				CLASS C 300 Feet Head 130 Lbs. Pressure				CLASS D 400 Feet Head 173 Lbs. Pressure				Approx. Lbs. Lead Per Joint 2 in. Deep	Approx. Lbs. Lead Per Joint 2 1/2 in. Deep	App. x. Lbs. Hemp Per Joint
	Weight of 12' Per		Weight of 16' Per		Weight of 12' Per		Weight of 16' Per		Weight of 12' Per		Weight of 16' Per		Weight of 12' Per		Weight of 16' Per				
	Foot	Length	Foot	Length	Foot	Length	Foot	Length	Foot	Length	Foot	Length	Foot	Length	Foot	Length			
	Foot	Length	Foot	Length	Foot	Length	Foot	Length	Foot	Length	Foot	Length	Foot	Length	Foot	Length			
3"	14.5	175	...	...	16.2	194	...	...	17.1	205	...	...	18.0	216	...	...	6.00	1.88	.18
4"	20.0	240	19.7	315	21.7	260	21.2	340	23.3	280	22.8	365	25.0	300	24.4	390	7.50	2.50	.21
6"	30.8	370	30.3	485	33.3	400	32.5	520	35.8	430	35.0	560	38.3	460	37.5	600	10.25	3.40	.31
8"	42.9	515	42.2	675	47.5	570	46.6	745	52.1	625	50.9	815	55.8	670	54.7	875	13.25	4.38	.44
10"	57.1	685	55.9	895	63.8	765	62.5	1000	70.8	850	69.4	1110	76.7	920	75.3	1205	16.00	5.33	.53
12"	72.5	870	71.2	1140	82.1	985	80.6	1290	91.7	1100	90.0	1440	100.0	1200	98.4	1575	19.00	6.25	.61
14"	89.6	1075	...	...	102.5	1230	...	...	116.7	1400	...	...	129.2	1550	...	...	22.00	7.50	.81
16"	108.3	1300	...	...	125.0	1500	...	...	143.8	1725	...	...	158.3	1900	...	...	30.00	10.00	.94
18"	129.2	1550	...	...	150.0	1800	...	...	175.0	2100	...	...	191.7	2300	...	...	33.80	10.95	1.00
20"	150.0	1800	...	...	175.0	2100	...	...	208.3	2500	...	...	229.2	2750	...	...	37.00	12.50	1.25
24"	204.2	2450	...	...	233.3	2800	...	...	279.2	3350	...	...	306.7	3680	...	...	44.00	15.0	1.50
30"	291.7	3500	...	...	333.3	4000	...	...	400.0	4800	...	...	450.0	5400	...	...	54.25	18.7	2.06
36"	391.7	4700	...	...	454.2	5450	...	...	545.8	6500	...	...	625.0	7500	...	...	64.75	23.4	3.00
48"	666.7	8000	...	...	750.0	9000	...	...	908.3	10900	...	...	1050.0	12600	...	...	85.50	37.5	4.37

Diameter of Pipe	CLASS 100 230 Feet Head 100 Lbs. Pressure				CLASS 150 345 Feet Head 150 Lbs. Pressure				CLASS 200 460 Feet Head 200 Lbs. Pressure				CLASS 250 576 Feet Head 250 Lbs. Pressure				Approx. Lbs. Lead Per Joint 2 in. Deep	Approx. Lbs. Lead Per Joint 2 1/2 in. Deep	App. x. Lbs. Hemp Per Joint
	Weight of 12' Per		Weight of 16' Per		Weight of 12' Per		Weight of 16' Per		Weight of 12' Per		Weight of 16' Per		Weight of 12' Per		Weight of 16' Per				
	Foot	Length	Foot	Length	Foot	Length	Foot	Length	Foot	Length	Foot	Length	Foot	Length	Foot	Length			
	Foot	Length	Foot	Length	Foot	Length	Foot	Length	Foot	Length	Foot	Length	Foot	Length	Foot	Length			
4"	...	...	...	...	16.6	200	16.3	260	16.0	289	...	...	17.9	215	17.5	280	17.3	311	...
6"	...	...	...	...	25.8	310	25.0	400	25.0	448	...	...	28.3	340	27.5	440	27.4	493	...
8"	...	...	...	...	36.3	435	35.3	565	35.0	629	39.6	475	38.8	620	38.2	688	42.9	515	...
10"	...	...	...	...	48.7	585	47.5	760	47.2	849	54.7	657	53.8	860	53.2	957	58.7	705	...
12"	...	...	...	...	63.7	765	61.9	990	61.6	1109	70.8	850	69.1	1105	68.8	1238	77.9	935	...
14"	77.6	931	77.2	1235	88.7	1065	86.2	1380	...	...	98.8	1186	97.1	1555	...	...	108.4	1301	...
16"	94.6	1135	92.2	1475	110.4	1325	107.2	1715	...	...	120.1	1442	121.3	1940	...	...	132.9	1595	...
18"	113.7	1367	110.9	1775	131.6	1579	130.0	2080	...	...	145.0	1740	147.5	2360	...	...	161.3	1935	...
20"	133.2	1599	129.7	2075	158.7	1904	150.9	2415	...	...	172.8	2074	172.5	2760	...	...	192.8	2313	...
24"	...	...	168.9	2700	...	...	201.9	3230	...	...	...	...	232.1	3715	...	...	260.6	4170	...

Table XII—List of Standard Bell and Spigot Fittings

Size Ins.	Tee Wt.	Cross Wt.	Size Ins.	Tee Wt.	Cross Wt.	BENDS			
3	95	120	24x 8	1664	1830	Size Ins.	90°	45°	22 1/2°
4x 3	120	153	24x 10	1699	1900	3	50	40	...
4x 4	128	166	24x 12	1735	1972	4	82	66	66
6x 3	170	204	24x 14	1777	2055	6	130	105	105
6x 4	183	221	24x 16	1825	2151	8	200	150	150
6x 6	200	257	24x 18	1852	2205	10	278	202	202
8x 4	255	294	24x 20	1991	2484	12	366	265	265
8x 6	270	325	24x 24	2113	2694	14	504	442	382
8x 8	294	372	...	...	...	16	750	558	484
10x 4	338	377	Size Ins.	Red. Wt.	Inc. Wt.	18	888	663	574
10x 6	352	406	6x 4	97	104	20	1070	964	858
10x 8	371	443	8x 4	119	132	24	1656	1515	1372
10x 10	395	493	8x 6	143	150	Size Ins.	Slv.	Cap	Plug
12x 4	445	486	10x 4	146	162	4	61	26	8
12x 6	458	512	10x 6	169	180	6	87	40	14
12x 8	474	545	10x 8	198	201	8	119	59	24
12x 10	491	577	12x 4	179	201	10	176	81	38
14x 4	588	641	12x 6	202	218	12	223	104	50
14x 6	608	700	12x 8	231	240	14	280	149	65
14x 8	636	761	12x 10	261	267	16	443	198	96
14x 10	653	796	14x 8	256	288	18	518	242	121
14x 12	672	834	14x 10	288	314	20	625	308	156
16x 4	760	841	14x 12	320	344	24	821	442	472
16x 6	779	879	16x 8	300	355	Offsets			
16x 8	808	938	16x 10	332	381	4	91	...	...
16x 10	849	1019	16x 12	364	410	6	183	...	...
16x 12	861	1043	16x 14	405	445	8	280	...	...
16x 14	880	1082	16x 16	461	484	10	390	...	...
16x 16	969	1259	18x 8	373	438	12	530	...	...
18x 4	927	1020	18x 10	405	468	14	695	...	...
18x 6	942	1049	18x 12	446	502	16	900	...	...
18x 8	974	1114	20x 8	502	541	Y-Branches			
18x 10	1012	1190	20x 10	569	585	4	103	...	...
18x 12	1049	1264	20x 12	529	615	6	181	...	...
18x 14	1057	1330	20x 14	576	656	8	291	...	...
18x 16	1082	1440	20x 16	638	700	10	434	...	...
18x 18	1144	1584	20x 18	776	800	12	632	...	...
20x 4	1148	1248	24x 14	764	866	14	985	...	...
20x 6	1164	1280	24x 16	838	917	16	1413	...	...
20x 8	1188	1328	24x 18	901	965	18	1737	...	...
20x 10	1227	1407	24x 20	987	1027	20	2199	...	...
20x 12	1263	1479	...	...	...	24	3599	...	...
20x 14	1318	1588	...	...	...	...	...	...	...
20x 16	1323	1597	...	...	...	...	...	...	...
20x 18	1341	1634	...	...	...	...	...	...	...
20x 20	1438	1828	...	...	...	...	...	...	...
24x 6	1637	1775	...	...	...	...	...	...	...

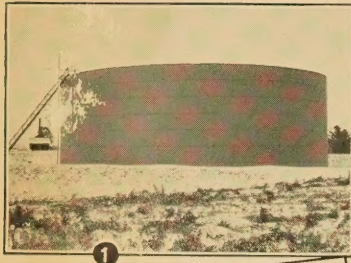
*Classes A, B, C and D indicate A. W. W. A. standard weights. Classes 100, 150, 200 and 250 indicate pipe made by special process by various manufacturers. Diameters are given in inches, lengths in feet, weights in pounds. Weights per foot include allowance for bell, weights per length include standard bell. Dimensions and weights are approximate. The difference in weight per foot of 12, 16 and 18 foot lengths is due to the weight of the bell being spread over longer lengths.

Table XIII—Theoretical Horsepower Required to Raise Water to Various Heights

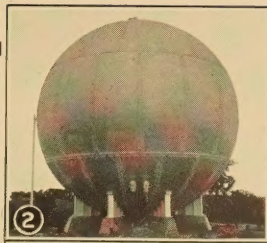
Feet	10	25	50	75	100	125	150	175	200	250	300	350	400	Feet
Gals. per Min.														Gals. per Min.
5	.012	.031	.06	.09	.12	.16	.19	.22	.25	.31	.37	.44	.50	5
10	.025	.062	.12	.19	.25	.31	.37	.44	.50	.62	.75	.87	1.00	10
15	.037	.094	.19	.28	.37	.47	.56	.66	.75	.94	1.02	1.31	1.50	15
20	.050	.125	.25	.37	.50	.62	.75	.87	1.00	1.25	1.50	1.75	2.00	20
25	.062	.156	.31	.47	.62	.78	.94	1.09	1.25	1.56	1.87	2.19	2.50	25
30	.075	.187	.37	.56	.75	.94	1.12	1.31	1.50	1.87	2.25	2.62	3.00	30
35	.087	.219	.44	.66	.87	1.08	1.31	1.53	1.75	2.19	2.62	3.06	3.50	35
40	.100	.250	.50	.75	1.00	1.25	1.50	1.75	2.00	2.50	3.00	3.50	4.00	40
45	.112	.281	.56	.84	1.12	1.41	1.69	1.97	2.25	2.81	3.37	3.94	4.50	45
50	.125	.312	.62	.94	1.25	1.56	1.87	2.19	2.50	3.12	3.75	4.37	5.00	50
60	.150	.375	.75	1.12	1.50	1.87	2.25	2.62	3.00	3.75	4.50	5.25	6.00	60
75	.187	.469	.94	1.40	1.87	2.34	2.81	3.28	3.75	4.69	5.62	6.56	7.50	75
90	.225	.562	1.12	1.68	2.25	2.81	3.37	3.94	4.50	5.62	6.75	7.87	9.00	90
100	.250	.625	1.25	1.87	2.50	3.12	3.75	4.37	5.00	6.25	7.50	8.75	10.00	100
125	.312	.781	1.56	2.34	3.12	3.91	4.69	5.47	6.25	7.81	9.37	10.94	12.50	125
150	.375	.937	1.87	2.81	3.75	4.69	5.62	6.56	7.50	9.37	11.25	13.12	15.00	150
175	.437	1.093	2.19	3.28	4.37	5.47	6.56	7.66	8.75	10.94	13.12	15.31	17.50	175
200	.500	1.250	2.50	3.75	5.00	6.25	7.50	8.75	10.00	12.50	15.00	17.50	20.00	200
250	.625	1.562	3.12	4.69	6.25	7.81	9.37	10.94	12.50	15.75	18.75	21.87	25.00	250
300	.750	1.875	3.75	5.62	7.50	9.37	11.25	13.12	15.00	18.75	22.50	26.25	30.00	300
350	.875	2.187	4.37	6.56	8.75	10.94	13.12	15.31	17.50	21.87	26.25	30.62	35.00	350
400	1.000	2.500	5.00	7.50	10.00	12.50	15.00	17.50	20.00	25.00	30.00	35.00	40.00	400
500	1.250	3.125	6.25	9.37	12.50	15.62	18.75	21.87	25.00	31.25	37.50	43.75	50.00	500



MODERN WATER STORAGE



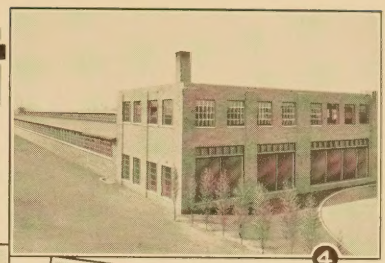
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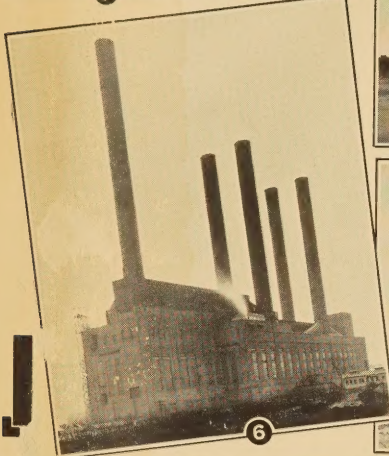
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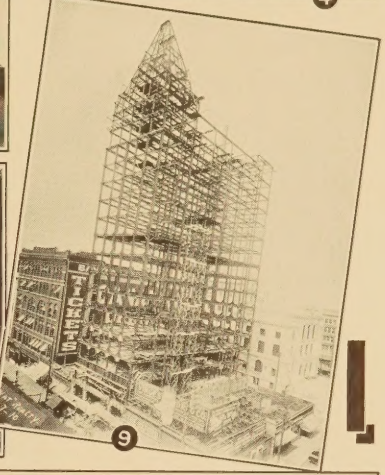
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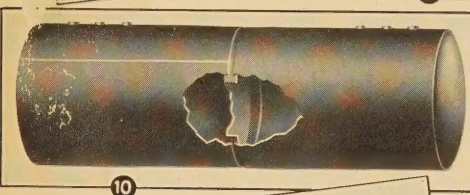
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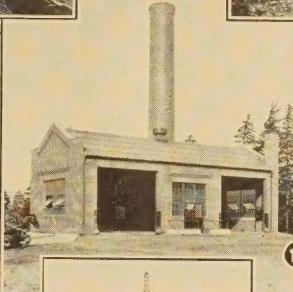
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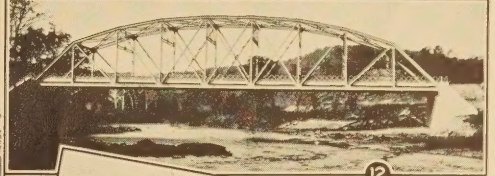
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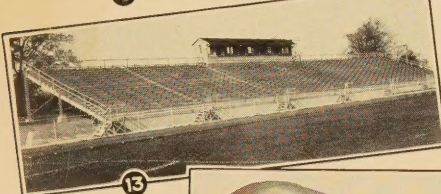
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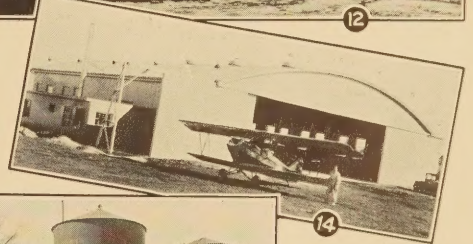
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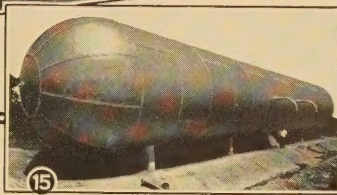
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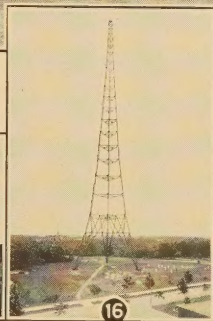
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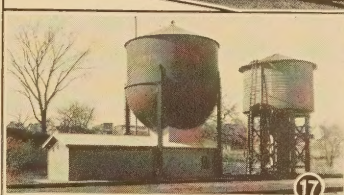
14



15



16



17

Other "Pittsburgh-Des Moines" Products

- 1—Storage Tanks for Oil
- 2—High Pressure Gasoline Spheres
- 3—Storage Bins
- 4—Industrial Buildings
- 5—Compressor Stations
- 6—Smokestacks

- 7—Surge Tanks
- 8—Penstocks
- 9—Structural Steel
- 10—Tanks for Service Stations and Bulk Plants.
- 11—Municipal Incinerators

- 12—Highway Bridges
- 13—Steel Grandstands
- 14—Airport Hangers
- 15—Gas Holders
- 16—Radio Towers
- 17—Railway Water Treating Plants



PITTSBURGH · DES MOINES STEEL COMPANY



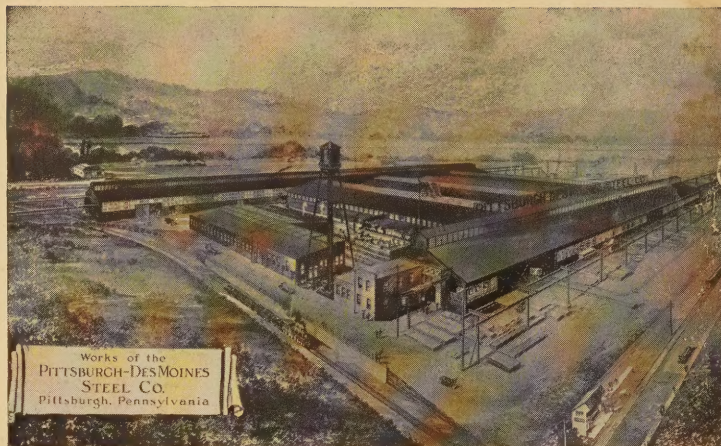


MODERN WATER STORAGE

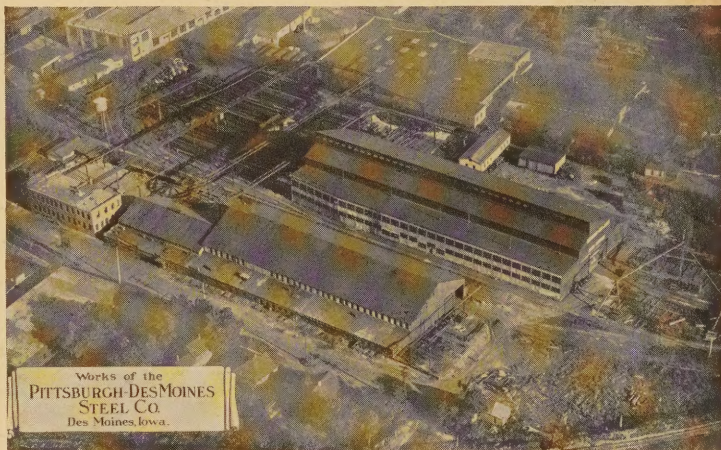


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Pittsburgh Plant



Des Moines Plant

Pittsburgh-Des Moines Steel Company

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Seattle, Wash.

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Des Moines, Iowa

1255 Praetorian Bldg.
Dallas, Texas

657 Rialto Bldg.
San Francisco, Calif.



OVER THIRTY-EIGHT YEARS' EXPERIENCE



